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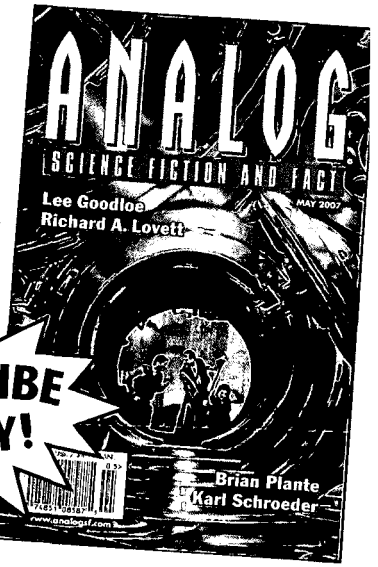

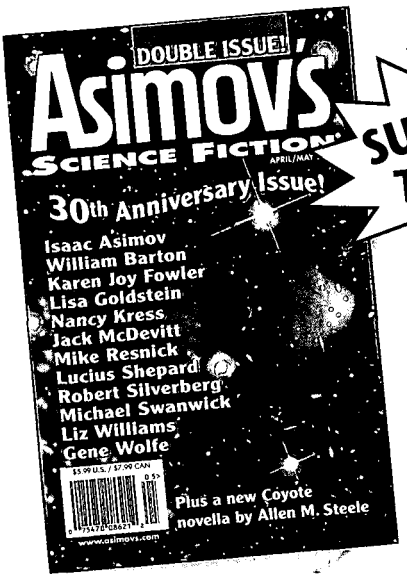

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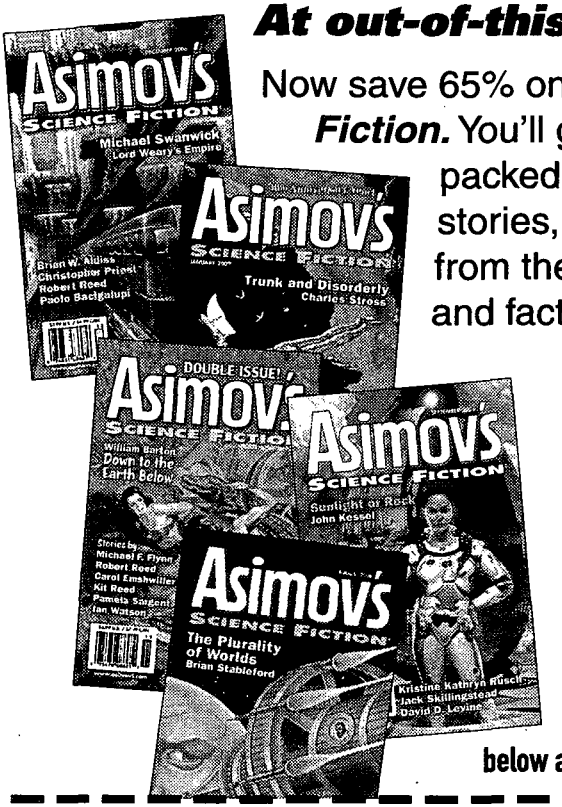

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Vol. CXXVIII No. 4
April 2008

Next Issue on Sale
March 4, 2008

36

86

SERIAL

MARSBOUND conclusion, Joe Haldeman ____ 96

NOVELETTES

GUARANTEED NOT TO TURN PINK IN THE CAN, Thomas R. Dulski ____ 8
THE BEETHOVEN PROJECT, Donald Moffitt ____ 36
AMOR VINCIT OMNIA, Craig DeLancey ____ 52

SHORT STORIES

RIGHTEOUS BITE, Stephen L. Burns ____ 68
INTO THAT GOOD NIGHT, William Gleason ____ 80
THE ANTHROPIC PRECIPICE, Jerry Oltion ____ 86

SCIENCE FACT

NUCLEAR AUTUMN: THE CONSEQUENCES OF A "SMALL" NUCLEAR WAR, Richard A. Lovett ____ 30

PROBABILITY ZERO

HOW I SAVED THE NATIONAL SCIENCE FOUNDATION, Robert Scherrer ____ 77

POEM

GOOD MORNING, CLASS . . . , Robert Lundy ____ 73

READER'S DEPARTMENTS

THE EDITOR'S PAGE ____ 4
IN TIMES TO COME ____ 139
THE ALTERNATE VIEW, Jeffery D. Kooistra ____ 74
THE REFERENCE LIBRARY, Tom Easton ____ 134
BRASS TACKS ____ 140
UPCOMING EVENTS, Anthony Lewis ____ 144

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Indicia on Page 5

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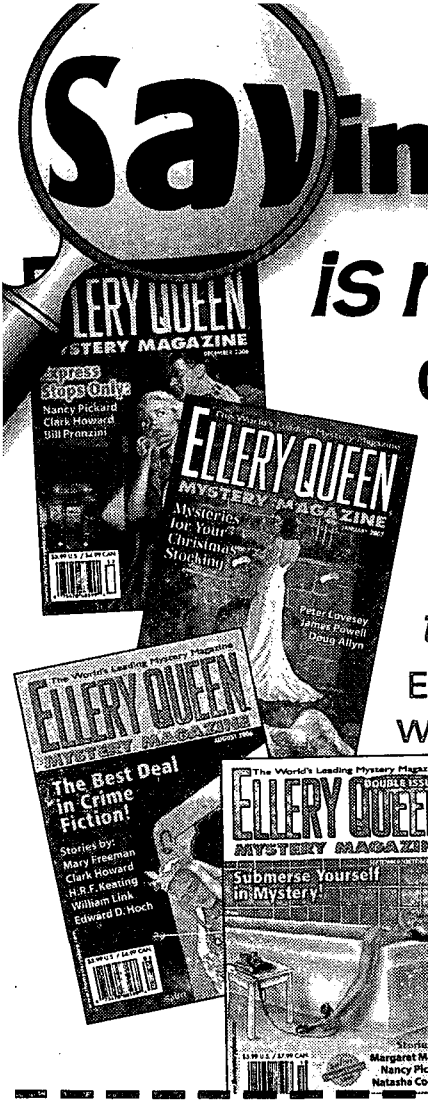

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EDITORIAL Stanley Schmidt

MIRRORS AND MIGHT-HAVE-BEENS

One of the things that make science fiction fun, thought-provoking, and occasionally enlightening is its ability to let readers vicariously experience, if only in imagination, cultures significantly different from their own. Nippon 2007, the World Science Fiction Convention held in Yokohama, Japan, offered readers and writers the chance to do that in reality.

It was the first Worldcon held in Asia, and any Asian culture is decidedly different from any of the North American, western European, or Australian ones that have hosted previous Worldcons. As science fiction has repeatedly demonstrated, a culture unlike your own can serve as a cultural mirror, calling attention to features of your native society that you may have never thought about because they were too ubiquitous and pervasive to notice—until you're immersed in a situation where those traits are replaced by others. And that experience induces reflection about why each culture is the way it is, whether its ways might be improved, and how and to what extent individual personalities are shaped by their cultures.

I want to emphasize early and explicitly that, in the musings that follow, I'm not saying or implying that either the American culture I grew up in, or the Japanese one I found so fascinating to visit, is in any objective sense superior or inferior to the other. Each, I suspect, has both strengths and weaknesses, and many people would disagree on which are which. But practically everyone would agree that there are differences.

There are also similarities, of course. Our world has already experienced a great deal of mixing of ideas and materials, and a first-time American visitor to a big Japanese city like Tokyo or Yokohama is likely to be struck early by the presence of familiar chain stores like McDonald's and Gap. But such a visitor will also notice some very obvious alienness, like the fact that (unless he or she has spent a *lot* of time preparing for the visit) those familiar signs will be almost the only things he can read. Japanese is seldom written with an alphabet (though it lends itself very well to one); usually it's written with a combination of two syllabaries and thousands of ideographs, which makes achieving literacy a truly major undertaking. Our visitor will soon notice other differences, too, such as the prevalence of "strange" foods like raw fish and seaweed, eating with chopsticks, and the fact that taxicabs are astoundingly clean, with immaculate white lace seat covers.

But all of those, unfamiliar as they may be to a European or American traveler, are relatively superficial and trivial details. The big differences are both subtler and more profound. They're matters of attitude. An American in Japan can hardly help noticing that essentially everyone he meets is extremely polite. Bowing is so common, on meeting or leave-taking, presenting or accepting anything, that it quickly becomes automatic even for somebody who's never done it before. (The "reflection" side of

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this observation is that many Americans, to a typical Japanese, must seem appallingly abrupt and rough in their manners.) Lines are orderly, smiles ubiquitous, and the vague feeling of lurking menace felt on so many streets elsewhere simply isn't there. That's not just an illusion, either: the crime rate is extraordinarily low (and to many Japanese, I suspect, it must seem strange that Americans tolerate as much misbehavior as they do).

Another contrast likely to impress an American visitor to Japan is a conspicuous lack of obvious diversity. Not a total lack; particularly in the big cities, adolescents are as likely as those anywhere else to try to shock their elders by adopting wildly unconventional fashions. But on a New York City subway car, and to a slightly lesser extent on suburban commuter trains, it's not unusual to look around and see nearly every seat occupied by people of obviously different ethnicity. On Japanese trains—both Tokyo commuter trains and long-distance trains to the north end of Honshu—my two traveling companions and I were almost the only people we saw who did not look Japanese. Immigration, as I understand it, is not encouraged, explicitly or implicitly. A teacher told me that teachers do not see their main mission as teaching their students math or science or history, but teaching them "to be Japanese." And the attempt to do that extends beyond the classroom: in at least some areas, PTAs patrol disapproved after-school hangouts to keep kids out of them, and PTA participation is mandatory.

That concept seemed to me to imply that the culture has developed quite specific ideas of what it means to be Japanese, and devotes considerable effort to making sure that everyone conforms to that ideal. That impression seemed to be borne out by my own observations, which I explicitly acknowledge were quite limited (though supplemented by conversations with people, both native and non-native, who have lived there). Much of Japanese life is highly ritualized. There are strict protocols—almost "scripts"—to be followed in all kinds of everyday situations, from eating to bathing to exchanging business cards. Everyone has a role to play and is expected to play it in a certain way. Not everyone has the same role; the very language has built into it an elaborate system of word choices and constructions that are used to express such subtleties as relative status of the speaker and the person being addressed. The pervasive politeness may stem partly from unusually prevalent innate good nature, but it also owes a lot to the prescribed rituals. One informant went so far as to say that much of it is "institutionalized hypocrisy" (as is much etiquette anywhere), but hastened to add that it's "better than the alternative." It works, and it may well be necessary in a country with more than ten times the population density of the U.S., and no fron-

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tier. The function of any system of etiquette is to make people treat each other decently whether they feel like it or not. Where a great many of them must live in close proximity, that becomes more necessary than ever, and may require a stricter system of rules. The success of the Japanese system proves that that many people *can* live in that small a space. Whether they *should* (assuming they have a choice) is a matter of taste.

Which leads us to the questions of how congenial any individual might find any culture, and why. Though I found Japanese culture fascinating and in some ways admirable, I never thought that I would feel at home in it on a long-term basis. Anyone who has read many of these columns knows that I see much that I think could be improved in my own culture. Yet, on the whole, I think I prefer it—and I emphasize again that this is purely a personal preference—for its more relaxed atmosphere and tolerance of individual variations. In general, ceremony doesn't do much for me, and I prefer to avoid it when possible. If I had to relocate permanently to Japan, I would feel constricted by the pervasive expectation that I must play a particular role in a particular way.

Or would I? How much of that feeling is due to my own intrinsic (i.e., genetic) nature, and how much to the fact that I was encouraged and/or allowed to grow up as I did in North America? It's entirely possible that, had I been born in Japan, I would have grown up quite comfortably Japanese.

Or that I wouldn't. Culture certainly plays a significant role in shaping individuals, even individuals who like to think of themselves as "self-made" rather than products of their environment. But so does the raw material they start with. Anthropologist Ruth Benedict, in her 1934 book *Patterns of Culture*, devoted much of her last chapter ("The Individual and the Pattern of Culture") to discussing "aberrant individuals," people who don't fit comfortably in their own culture but would do just fine in another. The reason for this is that cultures choose to reinforce a small part of the very broad range of possible human behaviors, providing ready-made roles for people with natural proclivities for those ways, but not for others. Her own society (1934 Anglo-America), for example, had no room for homosexuals. There is now considerable evidence that homosexuality is not a choice, but an inborn trait. People who had that trait were provided no socially accepted way

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to "be themselves" in Benedict's America—which led to individual misery and social friction. Amerindian tribes of the Great Plains, on the other hand, had an institution called *berdache* which provided a comfortable and respected niche for such people.

Benedict suggests two possible ways to improve the ability of aberrant individuals to function. (I emphasize that she and I are talking about *any* aberrant individuals—people whose natural tendencies are disapproved and discouraged by their societies—and not just homosexuals, whom I mention here only as one example). One is for the individual to learn to accept himself and create his own ways to live with both himself and an unsupportive society. The other is for society itself to become more tolerant of individual variations. Neither is entirely satisfactory, because one involves simply learning to live with hostilities rather than eliminating them, and the other depends on a large-scale social change that no individual can make happen. Both, however, are possible. A real-life example of the first is psychotherapy for individuals who have trouble fitting into their society. An example of the second is the observation that social movements sometimes can build up enough steam to produce large-scale shifts in attitudes: American society now has far more acceptance of homosexuals than it did in Benedict's day (though it's still far from complete or universal).

It occurred to me when I first read *Patterns of Culture* that there could be a third way: "therapy by matchmaking," in which individuals were analyzed and relocated into cultures more compatible with their intrinsic natures. Everybody could benefit: the individuals relocated would find themselves in more congenial surroundings, and their new homes would get more of the kinds of citizens they preferred. It wouldn't be easy to implement, of course; both individuals and cultures tend to resist change, even if it's good for them.

On the other hand, sometimes change does occur. In 1934, Benedict wrote, "No society has yet attempted a self-conscious direction of the process by which its new normalities are created in the next generation." And yet, it seems quite a bit of such conscious direction has occurred in the U.S. in the last few decades—not by the society as a whole, perhaps, but by big, vocal groups within it. I've already mentioned the shift in attitudes toward homosexuals, but there are many other examples involving, for example, other types of sexual behavior, smoking, and race. So I find it not inconceivable that some future societies may not only be more tolerant of individual variations, but more willing to try "citizen exchange," where individuals neither happy nor welcome in the land of their birth would be welcomed into others where they'd fit more smoothly.

I don't see that happening soon, but in the somewhat shorter term I can easily imagine that we'll get more chances to learn more about how people are shaped by their cultures and what determines how well they fit into a particular society. If human cloning becomes practical and accepted, for example, we may see more examples of what happens when genetically identical people are raised in different cultural environments. Somebody might even do that as a deliberate experiment. There would, of course, be the predictable cries of, "You can't experiment with human beings!" But, in fact, every new human being is a unique experiment. And with cloned individuals, where staying with natural parents is not an issue, future generations may not see any essential difference between raising two clones in different cultures to see how they turn out, and a family relocating to a different country to raise kids the old-fashioned way.

In any case, however we get it, more knowledge about how individuals are related to the cultures that produce them should be valuable and potentially useful. ■

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Guaranteed Not to Turn Pink in the Can

Thomas R. Dulski

Some conspiracy theories are right—but not in the way their proponents think.

You sweat in a suit in Palm Beach, even in February, so I had the air on max in the rented Buick. At a traffic light I took another pull on the Starbucks in the cup-holder and caught my eyes in the rearview mirror. Dark circles and bloodshot. I'd been in a card game that broke up at dawn and had just time to shave and shower the cigarette smoke out of my hair. Somehow, I had remembered how to tie a Windsor knot.

Traffic was light on the drive up from Miami—it was Saturday and anybody with sense or money was home in bed. I pulled into a service station and checked myself out in the mirror in the john. Brooks Brothers dark pinstripe, white shirt, gold cufflinks, red and green striped tie, red lapel handkerchief. *You'll pass, you asshole,* I thought. *But you had to wait until Romero and Vargas cleaned out your last hundred. When are you going to learn to fold? This could be big, and you almost blew it for a poker game.* I splashed some water on my face and popped a handful of breath mints. Roderick had said eight. I would actually be early.

I drove around the shopping district past a lot of exclusive "high end" shops with their lights still off and their alarm systems armed, ignoring the sensuous voice of the GPS on the dash. At 7:50 I decided I'd killed enough time and swung down La Brea as directed. It wasn't long before the scenery started shouting "MONEY" in big letters: monogrammed gates with intercoms and video cameras, ten-foot walls topped

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with spikes or razor wire. It was the kind of neighborhood that greeted you with an implied "Who are you and how did you get my address?" Roderick's money came from real estate, but not this sort, unless it was a minor sideline. A hasty internet check when I had gotten the call listed him as a mogul of shopping malls and industrial parks. Around a sweeping curve of manicured date palms I caught sight of the marina, straight ahead with the Atlantic and a glaring morning sun behind it.

T. Jason Roderick's yacht, the *Snark II*, was a 100-foot monster with a two-seat helicopter perched on a pad on its bow. A radar antenna was rotating on the roof of its forward cabin. I parked in one of the reserved spaces. As I was getting out of the car, I was confronted by two armed guards in identical beige shorts and monogrammed golf shirts. One asked for ID while the other murmured into a cell phone. Tweedle Dum stared at my Florida drivers license then squinted at my face. "Mr. Sanko?" Yeah, it had been Sanchez, Caesar Sanchez, once upon a time. But now it was legally Charlie Sanko because even today 500 million bucks doesn't hire a private investigator named Caesar Sanchez. This sandy-haired creep was looking at me like he smelled something bad so I snatched back my license.

"Roderick's having me review his security," I said, stooping to focus on his nametag.

"He's expecting you, sir," he said, donning a paste-on smile. "Please follow me."

Roderick was in a deck chair in a white robe and sandals. Tanned like old leather with thinning white hair, he might have been sixty, but he looked like it had been sixty miles of bad road. Or was it just the contrast to the leggy girl next to him—twenty-something, blonde, in an expensive one-piece—who peered at me over her sunglasses?

"Mr. Sanko, please sit down, " Roderick said, nodding at the next chair in a line of half a dozen. "Marta, Mr. Sanko and I have some business to discuss. Why don't you dial up a movie or something?"

Without a word Marta unfolded herself fetchingly from the chair and sauntered away.

Roderick turned to me, his deeply tanned furrows contrasted with a cold gray stare. "Now then, Mr. Sanko, I have a problem of a rather delicate nature and I have it from several sources that your methods are thorough and discreet."

That wouldn't have been my staple of marital infidelity cases he was talking about. Any PI with a digital camera makes his living with those. It might have been the Anderson Amusements International case—I'd saved their asses from a fraudulent damage claim. Or maybe it was some of those wash-and-wear banks—I'd done some laundry work for a couple that I wasn't particularly proud of. I just sat back and gave Roderick a non-committal smile.

"I have a daughter, Mr. Sanko. Pamela. She is twenty-five-years old and has a PhD in theoretical chemistry from Yale." Roderick produced a large cigar case and offered it to me. Illegal Cuban Cohibas in glass tubes. I took one and pocketed it. "Thanks," I said, "I'll save it."

He shrugged and uncorked one for himself, slicing the end with a gold cigar cutter. "Pamela had the world by the ass," Roderick continued. "She is smart and beautiful. A business associate of mine was prepared to offer her a position in his firm that would lead to vice president of research and development. Who knows how far she could have gone after that . . . ?" Roderick rolled the cigar end in a lighter's flame, then puffed leisurely. "Several universities offered her faculty positions. But she let it all go . . . to write this drivel." He reached under his chair and produced a hardbound book. The dust jacket showed one of those blurry photographs of a disk-shaped UFO, like a

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patty-pan squash, in the sky above a cornfield with a crowd of incredulous on-lookers in denim work clothes in the foreground. *Are We Ready,* it was titled. I turned it over. On the back was a picture of Pamela Roderick. Her daddy was right; she was a looker—reddish-brown shoulder-length hair, perfect teeth just visible between full lips, and green eyes canopied by long dark lashes.

Roderick blew a cloud of smoke that hovered a moment, then was caught by an ocean gust. "She takes after her mother," he said. "You never knew what *she* was up to."

"You are . . ."

"Divorced. She took up with a second-rate actor. Prenup saved me a bundle."

I began paging through the book. It didn't seem to be at all like your stereotypical lunatic fringe opus. After a few minutes I realized that it didn't fit the mold even remotely. The chapter titles alone suggested something very different: "Contact: Apotheosis or Anomie?"; "The Conquistador Model"; "The Proselytizing Model"; "Deconstructing Social Paradigms." I turned back to the Introduction, opened it at random and began to read:

UNLESS A CONTACT EVENT—WHATEVER FORM IT MAY TAKE—IS PRECEDED BY AN INFORMED DIALECTIC THAT ANALYZES THE COMPLETE SOCIAL CONSEQUENCES OF ALL LIKELY SCENARIOS, MANKIND IS CERTAIN TO EXPERIENCE A BOULEVERSEMENT OF AN UNPRECEDENTED SCALE. IT IS STRIKING THAT NO SERIOUS DISCUSSIONS TO PREPARE THE HUMAN RACE FOR WHAT MOST THOUGHTFUL PEOPLE REGARD AS AN INEVITABLE EVENT HAVE YET TAKEN PLACE OUTSIDE THE REALM OF SCIENCE FICTION. IN THIS VOLUME I HAVE ATTEMPTED TO INITIATE SUCH A COLLOQUY BY PAIRING PROJECTED FUTURE EVENTS INVOLVING EXTRA-TERRESTRIAL CONTACT WITH PROBABLE CULTURAL, ECONOMIC, PHILOSOPHIC, AND RELIGIOUS EFFECTS IN THE MODERN WORLD.

"It reads like a treatise in sociology," I said.

Roderick flicked some ash on the deck. "I haven't read the damn thing. It was on the bestseller list last year—may still be for all I know. The point is she's dropped her career in science to become a writer."

I started to hand the book back. "She's a big girl now," I said, disappointed. "I'm afraid I can't help you."

Roderick didn't take the book. Instead, he reached under his chair again and handed me another. "I'm not asking you to play truant officer, Sanko. Take a look at this."

The second book's cover showed a detailed drawing of some weird-looking plants and a lot of writing in a fluid cursive hand, but in an alphabet I didn't recognize. The title was superimposed in yellow: *The Voynich Verdict.* Pamela Roderick had co-authored it with somebody named Reggie Marsh. I flipped it over and there was Pamela with Reggie—tall and gaunt, but with a face like Tom Hanks and a hair-do like Howard Stern. I had to admit the contrast grated on me. "Charming couple," I said.

Roderick blew a smoke ring that was quickly torn apart by the quickening breeze. "It's not funny, Sanko." He spat violently on the deck between our chairs. "I hear they're engaged to be married." He turned that gray stare at me, and I could see that he meant business. "I want to know all about this Marsh guy. He's been influencing my daughter, and now he wants to be family. I want you to find out his angle, and then I want you to get rid of him for me." He sat back and puffed furiously to keep the cigar alight.

I squinted at him through a cloud of smoke. "I think you got the wrong idea about me," I said. "I'm not a hit man or a leg-breaker."

Roderick waved the cigar. "No, no, Sanko. No violence. At least for now. I have heard good things about your resourcefulness. . . ."

I read over the second book on the

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flight from Miami to Kennedy. It didn't take long to find out that it was a lot screwier than the first. Still, there was that professorial tone that gave the thing a ring of authority. It began with a plausible story:

It seems there was this Russian/American antique book dealer named Wilfrid M. Voynich. In 1912, Voynich discovered a very weird manuscript dated from the sixteenth century among a collection of old documents in an Italian villa. The item in question was a packet of 234 vellum pages profusely illustrated with crude drawings of plants that had no known counterparts on earth, with astronomical and astrological diagrams, and with pictures of nude women in a strange network of pipes and tubs. Some of the women were wearing crowns. The accompanying text was written in a language that no one in more than a century has been able to decipher.

In 1930, Voynich's widow, Ethel Lillian Voynich, inherited the manuscript among her husband's effects. When she died in 1960, it was left to her friend Miss Anne Nill, who sold it the next year to Hans P. Kraus, a New York-based antique book dealer, for $24,500. He attempted to sell it for his asking price of $160,000, but no one snapped it up. In 1969, he donated it to Yale University's Beinecke Rare Book Library where it currently resides as catalog number MS408.

Pamela and Reggie's book turned the Voynich manuscript into the key plot element in an alien abduction scenario with a new twist. Apparently, a claim has been made that the Voynich pictures contain symbols suggestive of the Albingensian religious movement that had been stamped out by the Crusaders and the Inquisition three centuries prior to the presumed date of the document. According to Pam and Reggie, in the 1230s, when the religious crusade against the Cathari (as they were called) was at its peak, a few hundred of the fleeing heretics were rescued from the Languedoc region of France by one or more alien space ships. The earthlings, men and women, were transported to the aliens' home planet in another star system, where they were culturally assimilated. In the sixteenth century, after about fifteen generations of life on the alien world, a few of the descendants of the rescued Cathari were returned to earth. By then the furor over their forebears' beliefs had been forgotten, but the returned Cathari were understandably cautious and secretive. Pamela and Reggie claimed that the Voynich manuscript was the record of their life on the alien world.

The stewardess sold me a can of beer and plopped down two small bags of pretzels on the service tray. I sipped and munched through part of a chapter on that strange alphabetic text. Apparently, linguists and code-breakers have been working on this thing ever since Wilfrid Voynich discovered the manuscript. Nearly all the experts said that it was *not* gobbledy-gook, that it had the rhythm and flow of a real language. Presumably, a talented linguist could invent a convincing new language as a hoax, even in the sixteenth century, but what kind of lunatic would have the skill and patience to sustain it for 234 pages?

When we arrived at JFK, the terminal screen said that the hedgehopper to New Haven was delayed. Rather than sit it out, I found a rental booth and signed up for a Grand Marquis. It wasn't going to be that bad of a drive. I made a spur of the moment detour to Quick Jerry's, a print shop in Jersey City. It was run by an ex-con I knew who had spent some hard time for forgery. I was collecting on a favor he owed me. Half an hour later I picked up Interstate 95 just south of New Rochelle and headed up the Connecticut coast past Stamford, Norwalk, and Bridgeport.

A little under two hours later I was strolling the Yale campus in the center of New Haven, trying not to look out of

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place. I was carrying a briefcase and had donned a pair of glasses and a cardigan sweater. It was a sunny winter day but I shivered a bit from the unaccustomed chill. There were still a few melting snow-piles—vestiges of the last winter storm.

The Beinecke Rare Book and Manuscript Library contrasted sharply with the venerable limestone columns and hallowed stone and redbrick structures of the campus. It was a huge rectangular prism composed of translucent marble panels framed with granite, and it sat in the center of a quadrangle decorated with geometric abstract sculptures. Stepping inside its controlled atmosphere I was brought up short, first by the quality of the diffuse natural light from the immense array of translucent marble, then by the central book tower, six stories high. The outer walls were revealed as a giant shell encasing a steel superstructure of steps and shelves loaded with books and documents.

"May I help you, sir?" A woman's voice. A rent-a-cop in my line of sight pointed over my left shoulder where a pretty young thing behind a large counter was motioning me over.

I let the glasses slide forward and pushed them back with my thumb. I wrinkled my nose, knitted my brow and showed some teeth like I was trying to focus on her. I was overdoing the Nutty Professor, I realized and knocked it off.

"Are you a faculty member, sir?" she asked.

"Ah, no. That is, not here. At Yale, I mean."

"Could I see a photo ID, please?"

I made a show of fumbling in several pockets, finally producing the laminated card that Quick Jerry had run off for me. It was made out for a small mid-western university. She checked it out, entered something in a computer, handed it back, then slid over a flat-screen and stylus. "Please sign in, Professor Sanko."

The girl gave me a bar-coded visitor's badge, a brochure, and a map of the library. I started to walk away, then abruptly turned back. I had suddenly remembered a name from the book's Acknowledgement page. "Oh, ah, Miss . . . You wouldn't have a Dr. Hans Dietrich on your staff here?"

"Dr. Dietrich?" she said. "Why, yes. Let me check his schedule." She tapped again at her keyboard. "Mm . . . Dr. Dietrich is out today. Could I have his teaching assistant, Miss Chandler, help you?"

"That would be lovely," I said.

Ann Chandler was a cute twenty-two-year-old grad student with a honey blonde bob cut and wire-rim glasses. We were at a table in the huge reading room. Both of us were wearing white nylon gloves, and the Voynich manuscript and several boxes of related materials were opened before us.

"Dr. Dietrich wrote an article refuting the Roger Bacon authorship," she was saying. "Would you be interested in a reprint?"

"Yes, indeed I would," I said, "but for now I'm particularly interested in your . . . or Dr. Dietrich's overall understanding of the background of the manuscript." I waved my gloved hand. "Just presume that I know nothing at all about it."

"Well," and Miss Chandler blushed a little, "stop me if I begin boring you."

"That you shan't do, young lady."

She knitted her brows. "The earliest record of it, as you probably know, dates from the court of the Holy Roman Emperor Rudolph II in the late sixteenth century. Someone had sold it to him for six hundred gold ducats." She looked up and smiled. "That was an astonishing amount of money for a manuscript at that time—something like $50,000 today. But Rudolph collected oddities—giants for his army, dwarfs for his court, as well as magicians, alchemists, necromancers . . ." She caught her breath. "You must have heard about the connection with John Dee and Edward Kelley?"

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I hadn't a clue, but I liked her youthful enthusiasm. What I said was: "Of course, but it's always helpful to hear a fresh take on the facts."

Ann Chandler took that as a green light to really open up and demonstrate her knowledge. "Well, John Dee was likely a sincere humbug who believed himself to be a great sorcerer. He was Queen Elizabeth's astrologer and she consulted him from time to time throughout her reign. Kelley, on the other hand, was clearly a charlatan who duped many people, including Dee. They first met when Kelley appeared at Dee's door wearing a skullcap to conceal the fact that he had lost his ears in punishment for forgery. Kelley duped Dee, convincing him that he was a sensitive, a 'scrier' as they called it, who could channel with the angels and the dead. He also claimed to have a powder that converted base metals into gold.

"Dee and Kelley teamed up and traveled with their wives across Europe in the 1580s, demonstrating their arcane talents. At one point Kelley actually convinced Dee that a spirit wanted them to share each other's conjugal beds." I expected a blush at this, but Anne Chandler just smiled coyly. "It was natural that they gravitated to Rudolph, who loved anything occult. Kelley had already invented a language, Enochian, that he claimed his angel contacts spoke in heaven, so some people think that he also invented the language of the Voynich manuscript. Dee, on the other hand, was an expert on the works of Roger Bacon. And so it's a short stretch to imagine that Kelley and Dee sold the manuscript to Rudolph, representing it as a newly discovered text written by Roger Bacon. Dee may even have believed it himself."

I turned a few pages carefully with a gloved hand, feigning interest in the curlicues of the text and the crude colored drawings. "I suppose," I said, "the main question is: was Kelley capable of such a sustained effort?"

The girl nodded enthusiastically. "It's a major question. The Voynich text is the biggest mystery in historical cryptology. It's been scrutinized by dozens of professional and amateur code-breakers and linguists over the last century. No one has even been able to prove definitely whether it's a code or a language. Subjectively, the text looks like a cursive alphabetic language, written from left to right. There are no obvious corrections or erasures. The fluid cursive style suggests that the writer did not have to stop and look up or calculate the next letter."

She produced a folder. "I brought along some notes," she said. "There are approximately 170,000 glyphs or 'letters,' spaced to form about 35,000 words," she read. "The 'alphabet' consists of somewhere between twenty and thirty characters, depending on one's guess as to what constitutes a letter. Some glyphs are only found at the start of words, some only in the middle, and some only at the end. There are almost no words composed of more than ten glyphs and very few one—and two-glyph words. There are a large number of repeats and sequences of words that differ by only one glyph. Words that appear to be figure titles seldom recur elsewhere."

Ann Chandler looked up from the folder notes. "Is this the sort of information you were looking for?"

"Please go on," I said.

"A statistical treatment of the text showed that word frequency followed Zipf's Law." She looked up. "All that means is that, just as in all known languages, a few words like 'the' and 'and' occur with a high frequency, while most words are rare and the tail-off is steep. The word entropy is similar to that of English and Latin."

"Word entropy?" I said. "That sounds familiar."

The girl shrugged. "I had to look it up. It comes out of Claude Shannon's work on information theory. Apparently information and thermodynamics are deeply

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connected. In fact it's been suggested that thermodynamic entropy is a special case of information entropy. Are you familiar with the TV game show *Wheel of Fortune?* Well, there you have a sequence of blanks and spaces and you guess letters to identify a phrase or title. Each letter that you guess correctly gives you a bit of information about the puzzle. Assuming you are the only player, if you would total up all your wrong guesses as bits, the information entropy of the puzzle is the total number of bits needed to use to solve it." She caught her breath and continued. "Actually, that's single character entropy. But in all known alphabetic languages the characters are not independent of each other. If Vanna turns over a 'q' you know the next letter is a 'u'—that's richer information. There are hundreds of similar clues—a 'th' is always followed by an 'r' or a vowel, for instance. They call that second-order entropy. The Voynich manuscript's word entropy has been estimated as ten bits per word, which is similar to the value for English."

She stopped and looked up at me. "Am I going on too long, Professor Sanko? It's one of my favorite topics. I wasn't sure just where your interest lies."

I adjusted my glasses with a gloved hand. "Well, ah, Miss Chandler, perhaps we can put away this remarkable document and discuss the subject further over a cup of coffee?"

The warmth of the coffee shop and the coffee took some of the library's humid chill out of me, and the clink of plates and the murmur of conversation were a nice contrast to the austere hush of the Beinecke. Ann Chandler was a nice person, I decided, but I couldn't help wondering what she was like when she let her hair down. I was listening to her talk as I spread cream cheese on a bagel.

"Many believe that even a resourceful forger and mountebank like Kelley would be incapable of producing the Voynich. In 2003, Gordon Rugg from Keele University in Britain published a paper in *Nature* that claimed to reproduce the features of the Voynich language using a Cardan grille."

I raised my eyebrows over my coffee cup to plead ignorance.

"It was invented in the sixteenth century by a Renaissance mathematician named Gerolamo Cardano as a device for decoding secret messages. It was simply a card with a series of holes cut out at selected places. To decrypt a message you laid the card over a page of some 'carrier' text and read out the message through the holes. Rugg used a Cardan grille over a prepared table of Voynich glyphs to generate a text with some, but not all, the traits of the Voynich manuscript. Rugg suggested that Kelley could have generated the Voynich text in that way with about three months of concerted effort. Many linguists are not buying it though. The Voynich is still defying analysis."

"Miss Chandler," I said, trying to make conversation, "surely the Voynich doesn't dominate all your life. What occupies your leisure time, if you don't mind a personal question?"

She was in mid-sip and wrinkled her nose at the taste. "I play tennis, jog, and write poetry."

"What sort of poetry?"

"Pastoral odes, blank verse, a lot of personal things . . . My boyfriend said I should paper the walls of my apartment with my rejection slips."

"So you are a poet. Any other interests?"

"I love to read, though my tastes aren't very discerning."

I took a bite of the bagel and chewed thoughtfully. "Best sellers, I suppose?" I said.

"Sometimes."

"You wouldn't have heard of something called *The Voynich Verdict?*"

"Oh, *that!*" she said and set her cup down hard, so that the spoon bounced

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out of the saucer. "Do you know that a faculty member here . . . well, a *former* faculty member, co-authored that book?"

"Really?"

She nodded. "Pamela Roderick. I feel partly responsible. I provided her with most of the background materials. Neither Dr. Dietrich nor I had any idea that she was going to write a text about flying saucers."

I motioned to the waitress that we needed coffee refills. "So you worked with her for a while. Just out of curiosity, what sort of person was she?"

"*She* seemed normal enough. Rather pleasant, actually . . ."

"But . . . ?"

Miss Chandler poured a packet of sweetener into her cup and stirred thoughtfully. "*But* that guy she brought with her."

"That would be her co-author?"

"I think so."

"What about him?"

"He had these stare-y eyes." Ann Chandler suppressed a shudder.

I switched the Professor of Comparative Linguistics ID for a press card made out for a prestigious science journal—another example of Quick Jerry's art. I lost the briefcase and glasses and pocketed a voice recorder and notepad. The Chemistry Department secretary glanced at my new credentials and picked up a phone. "Dr. Janeway, there's a gentleman here from *Science Today* who would like to talk to someone about Pamela Roderick."

Eliot Janeway, the dean of the department, was a larger than life figure—tall and big-boned, with lots of black hair, a full beard, and a booming voice—a youthful fifty, I estimated. He led me back into a cramped private office and closed the door. "I suppose this is about that new book of Pamela's. I understand it's making quite a media splash."

"Why, yes," I said, "we're covering it as a news feature. Our readers generally expect some background when we deal with something a little . . . flippant."

Janeway leaned back in a leather swivel chair, lacing his hands behind his head. "Actually, its not all that funny, Mr. Sinowitz." He knitted black, shaggy eyebrows. "Pamela gave up a promising career in theoretical chemistry—modeling quantum chemical dynamics—for this strange pursuit. We were all a bit shocked when she turned in her resignation a few weeks ago."

"Where is she now? Do you know?"

"It was my understanding that she was due to begin a book signing tour this week. I think it's starting in New York City."

I took out the recorder, pad, and pencil. "You don't mind?" I asked.

"Not in the least; although I'm afraid if you're looking for reasons, I won't be able to supply any."

"Speculation, then?"

He fingered a ball and stick molecular model that had been serving as a paperweight. "We were all proud of her for that first book."

"Are We Ready?"

"Yes. I thought it was a *tour-de-force* of sociological speculation, well grounded in fact. The only eyebrows it raised around here were from those who hadn't bothered to read it. I remember thinking at the time: why shouldn't scientists occasionally step out of their field and contribute something noteworthy to the popular literature? After all, C.P. Snow wrote novels, Carl Djerassi writes plays, and physicists are always morphing into social commentators."

"That first book—did anyone in the Chemistry Department know about it while it was being written?"

"Well, I certainly didn't. Although, in retrospect, if I had, I would have encouraged her."

"It didn't affect her work, then?"

"Not in the slightest. In fact, we co-authored a paper in the *Journal of Physical Chemistry* around that time. Pamela was—is—a fine theoretical chemist."

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"When the first book became such a publishing success were you at all concerned about how the accompanying notoriety would be perceived by the university administration and the student body?"

"You mean Pamela's interviews on Oprah and Letterman? I think most people around here were tickled pink about it. You know, she gave a faculty seminar on the topic of that first book at the chancellor's request."

"But the second book—that was quite different," I offered.

"To say the least. Pamela began bringing around this fellow Marsh while they were working on that."

"What sort of person was this co-author, Reggie Marsh?"

"To be perfectly honest, I was never formally introduced, but he seemed a bit odd. I didn't pay a great deal of attention." Janeway laughed. "We meet eccentrics fairly regularly in the theoretical sciences."

I made a series of squiggles on the notepad, trying to make it look like shorthand. "In what way was he odd?"

"In mannerisms more than in appearance I'd say. For one thing, he stood too close when he talked to you. I heard a couple of people joking about their personal space being violated. And apparently he was a compulsive talker once he got wound up. Lots of hand gestures—that sort of thing."

"What did he talk about?"

"I gather it was mostly about some sort of flying saucer society that he was involved with. Here—this appeared on my desk one morning." He tossed me a brochure. "I understand that most of the Chemistry Department got one."

It looked to be composed with a desktop publishing program—a tri-folded sheet of copier paper printed on a low resolution ink jet color printer:

CENTER FOR THE INVESTIGATION OF ANOMALOUS AERIAL PHENOMENA (CIAAP)

A blurry black and white photo of some oval lights in a V-formation in the sky above a streetlight. The caption read, "What does the government know about this, and why is it being suppressed?" This was followed by a series of bulleted blurbs designed to catch the attention of the prospective true believer:

•An archive of over 1,000 UFO photographs
•Transcriptions of first person accounts of alien abductions
•Recently declassified government documents—Project Bluebook
•George Adamski Revisited
•A New Take on Erich von Däniken
•Is Shirley MacLaine still *Out on a Limb*?

There was a New York P.O. address, a phone number, and a website domain address.

"Can I keep this?" I asked.

"Sure. Pretty far out stuff, huh?"

I pocketed the brochure. "Do you think Pamela Roderick has really bought into little green men?"

"Actually, I believe they're supposed to be gray with large lidless eyes." Janeway was chuckling. "The main story is about the descendants of the religious sect returned to earth after a few centuries on a world in a star system forty seven light years away."

"You've read the second book then?"

He rummaged through a disorderly stack of books and papers on his desk. "I had it here somewhere. . . . But, yes, I read most of it. They make a pretty authentic-sounding case for an outrageous fabrication. As to Pamela's real beliefs, it's hard to say. Brilliant people have been known to be taken in by fortune tellers, spiritualists, charismatic leaders. . . ." Again, he knitted his black shaggy brow. "You know, Mr. Sinowitz, if she's really putting us on, she's doing one hell of a job."

The satellite internet connection for

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the laptop had been a little slow, but I managed to log on to the CIAAP website between bites of a Big Mac in the Yale parking garage. The calendar of New York City meetings showed nothing until the end of the month, so I hyperlinked to Marsh's e-mail address and typed:

Dear Mr. Marsh:

I have been following your revelations avidly for some time now. I have vital new information that confirms your theories on the thirteenth century abductions. Please respond with a date, time, and location for a meeting.

Sincerely,

Samuel Roscoe

Then I Googled Reggie Marsh. I didn't find anything too startling. He had published an article on cattle mutilations in the June 1989 issue of *Kansas Farmer*. Born in Topeka in 1966—that made him a boyish-looking forty-four. Graduated from Kansas State with a BA in Agriculture in 1987. Worked as a technician in a state government Ag Lab 1988 to 1993, then sold irrigation equipment the rest of the '90s. Published three more articles, all on alien abduction scenarios, in small circulation magazines. Helped to set up CIAAP in 2000 after moving to New York. Since then he has been the UFO feature editor of a weekly newspaper called *Conspiracy Disclosure*. Lists freelance writer as his current occupation.

Next, I searched the websites of the larger Manhattan bookstores. The Barnes & Noble on Fifth Avenue was announcing a *Voynich Verdict* book signing by Pamela Roderick tomorrow from 1:00 to 3:00 p.m. Finally, I reserved a room at the Plaza, figuring I'd earned a bit of luxury, and, after all, Pamela's old man was paying my expenses.

Even people who hate Gotham have to admit that it's beautiful at night. Aerial views are popular, but it's at ground level that the splendor, the sleaze, and the chaos make for a real light show. The rented Mercury was an intruder here among a sea of yellow cabs, buses, and chauffeured limos.

I tossed the keys to the doorman at the hotel and pocketed a numbered ticket. I made about five steps across the lush lobby rug before a bellhop grabbed my suitcase and laptop.

The room overlooked the dark expanse of Central Park. It was furnished in French Provincial in a motif of Kelly green and burgundy with a turned-down king-size bed and three large overstuffed chairs. There was a small vase of fresh flowers on a half table before a gilt-framed oval mirror. I popped a chocolate from one of the pillows and rummaged through the service-bar, finally selecting a seven-dollar can of Heineken. I found the remote, crashed into one of the chairs, and turned on the wall-mounted flat-screen. Surfing through the channels proved a big waste of time, as I expected. I was just about to go back to a Rangers hockey game when I saw a close-up of Pamela Roderick.

It was the *Jack Ratt Show*. Ratt had black hair combed straight back, a gold earring, and a profile like a cigar store Indian. He was seated across an oak desk from Pamela Roderick, listening intently. I turned up the volume.

"—Georg Baresche, the earliest documented owner of the Voynich. He was an alchemist in Prague in the early 1600s. When he died, the manuscript passed to Jan Marek Marci, the rector of Charles University in Prague who promptly sent it to Athansius Kircher, a Jesuit scholar at the Collegio Romano in Italy. Marci's cover letter was still attached to the manuscript when Voynich found it. It is the source of the claim that Emperor Rudolph II had owned it in the previous century."

I had read somewhere that Jack Ratt, a relative newcomer, was going after Charlie Rose's audience. He leaned forward as he scanned prompter notes on

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the desktop screen. "And so how did the manuscript end up in the Villa Mondragone where Voynich found it?"

Pamela tossed back a wave of red hair. "It has been assumed that the manuscript remained in the archives of the Collegio Romano until Victor Emmanuel II's army captured Rome and the Papal States in 1870. Many Church properties were being confiscated by the new government, but a great number of books in the Collegio's library were transferred to the personal libraries of its faculty since these were immune to confiscation. Kirchner's papers became part of the private library of Petrus Beckx, the Rector of the school and the twenty-second General of the Jesuit Order. Beckx's library was later moved to the Villa Mondragone, which had been converted into another Jesuit school—the Collegio Ghisleri. In 1912, in need of funding, the Collegio decided to discreetly sell some of its manuscripts."

"Enter Voynich," Ratt said.

"Yes," Pamela agreed.

I sipped at the Heineken. This didn't sound like a girl who had taken a plunge off the deep end.

There was a pause—long for TV, which abhors a vacuum. Then Ratt said: "Ms. Roderick—Pamela, we've traced the provenance of this strange manuscript. Now what leads you to believe that it represents a record of extra-terrestrial contact?"

She cleared her throat and drank from a coffee mug, perhaps gathering her thoughts, then matter-of-factly said: "The Voynich contains illustrations of plant forms that never grew on earth. It contains astronomical charts that represent star patterns not seen from the earth's perspective. There are also symbols that have been associated with the Cathari, a religious sect that was persecuted in the thirteenth century. Those are established facts." She paused, sighed, and continued. "We have good evidence to support the belief that the Voynich manuscript was intended as a holy book."

"A *holy* book?"

"Yes. Perhaps in the sense that *Exodus* recounts history, or a historical tradition. It is an account written by the returned progeny of the Cathari who had been abducted, or as we prefer, *rescued,* from Earth in the thirteenth century."

Ratt scanned the teleprompter notes. "What about the theory that some sixteenth century charlatan created the Voynich as a money-making hoax?"

Pamela smiled charmingly. "The manuscript may have been stolen and the hoax story may have been a cover-up. You see, the book was written by the first arrivals who were returned to Europe around 1500, roughly three and a half centuries after the Albingensian rescue. They were few in number—possibly less than ten individuals—and understandably cautious about their beliefs and history after the stories of the way their ancestors had been treated. "

"Why were only a handful returned?"

"Only a few chose to return. Most preferred to remain at their new home."

"In the alien star system."

"Yes."

Ratt looked directly at the camera. "We'll return to this fascinating story right after these messages."

I hit the mute button and took a pull on the Heineken. It was almost like the classic description of psychosis that psychoanalysts are cautioned about. Perfect, often brilliant rationality until the one subject is broached . . . Some book publisher was making a windfall on Pamela's delusion. Or was she putting the world on? Certainly, with her old man's fortune in her future she wasn't trying to sell books for the royalties.

I noticed Ratt and Pamela were back and cancelled the mute.

". . . exactly is or was Albingensianism?" Ratt was saying.

"A form of Gnosticism, some say it was strongly influenced by Manichaeism. It was a dualistic religion that posited that the Demiurge who cre-

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ated the Earth was Satan, who they identified with the God of the Old Testament. They rejected all worldly matters as part of the inherent evil of Creation. War, capital punishment—all taking of life was abhorrent to them. They also proclaimed a True God who dwelt in a realm of light and who could only be reached by a life of purity and asceticism. Many abstained from the consumption of all animal products and refused to take oaths, which were regarded as accepting the domination of the malevolent Creator."

Ratt widened his eyes at this. "I take it this was a short-lived phenomenon."

"Comparatively brief. The movement arose in the eleventh century in the Languedoc region of southern France. In the twelfth century it spread to Italy, Spain, and Germany, and to northern France. The adherents were called Cathars from the Greek for 'pure ones.' The lengthier appellation 'Albingensians' refers to a town called Albi that was a hotbed for the religion, but the movement had no real center. In 1176, the Catholic Church declared it a heresy, but missionary efforts to convert the Cathars failed. In 1209, a full-fledged crusade against Albingensianism was declared. The veterans of earlier crusades to liberate the Holy Land responded enthusiastically. It was close to home and there was the promise of land and plunder. The crusade proved to be a series of bloody massacres in which little distinction was made between heretics and loyal Catholics who inhabited the same regions. The attacks took place at intervals over twenty years. In 1229, the major aggression was over and the Inquisition was established to root out and execute the remaining recalcitrants. By the early fourteenth century the Albingensian movement had been wiped from the face of the Earth."

Ratt produced *The Voynich Verdict* and opened it to a bookmark. "But—according to your book—not from this distant world of aliens."

"That's right," Pamela said. "Alien visitors rescued approximately one hundred Cathars and transported them to their home world. Then, slowly, starting in the 1500s and continuing sporadically up until today a few of their progeny have chosen to return to earth."

I shut off the TV and tossed the remote onto the bed where I had placed the laptop. On a lark, I got up and decided to check my e-mail. And it was there—Marsh had taken the bait:

DEAR MR. ROSCOE:
YOUR COMMUNICATION HAS PIQUED MY INTEREST.
CALL ME AT (212) 555-4949.
REGGIE MARSH

This was too good—a New York City area code. I dialed and got Manny's Pub in the East Village. Yes, they had a Reggie. When they got him, his voice sounded normal enough, although the bar was noisy and there was theremin music in the background.

"Mr. Marsh, I can't believe my good fortune," I said. "Yes, I'm in Manhattan. I'll catch a cab and be right down."

On the way, I couldn't help thinking that only barfly characters out of William Saroyan give a saloon as their personal phone number. When the cabbie found the place I was reminded of the warlock hangout in *Bell, Book, and Candle*, only this one was devoted to "UFOlogy." A cardboard little green man with an "LGM" monogrammed spacesuit was propped against the window where a Coors Light neon glowed. As I stepped in I noted that the motif continued with a muted TV tuned to the Sci Fi Channel and a pole dancer in silver tights and space helmet grinding to the Star Trek theme. The place was jammed with a mix of college kids and strange—some really strange—older folk. I nudged my way to the bar and caught the eye of a blond-bearded barkeep. "You got a Reggie around here?"

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He pointed across the room where a circle of chairs surrounded a podium—or was it a karaoke machine? The central figure was the Hanks/Stern image I'd seen on the dust jacket of *The Voynich Verdict.* He was holding court among a group of true believers—mostly young, twenties, but a few old-timers. They all held glasses or beer bottles in their hands. I drifted over, but stood back a ways and listened.

"Let's only talk about confirmed third kind encounters," he was saying. "I don't know about you, but I'm not particularly interested in moving lights in the sky. Some of those sightings really *are* weather balloons, bolides, sundogs, whatever else the Air Force claims. What I want to talk about are the documented landings or crashes of alien spacecraft. I'm referring to Roswell, New Mexico, July 8, 1947; Levelland, Texas, November 2, 1957 . . ." He was ticking items off on his fingers. ". . . Kecksburg, Pennsylvania, December 9, 1965; Shag Harbor, Nova Scotia, October 4, 1967; Berwin Mountain in North Wales, January 23, 1974; Rendelsham Forest in Suffolk, England, December 26, 1980. These are landings, ladies and gentlemen, landings and crashes."

Some young girl among the circle of listeners hesitantly raised her hand.

"Yes! Debbie has a question!"

"How could the aliens fly all the way from—wherever—and crash making a routine landing?" This was followed by groans from several of the faithful.

Marsh held up a palm. "Please. She's new here. Crashes, like Roswell, are rare events, but they do occur because the aerodynamics of our atmosphere are quite different than the windless plains of the home world. Also, such crashes tend to draw attention, while hundreds of routine landings over the centuries have gone unnoticed." He stopped and smiled at the girl, who seemed embarrassed. "Does that answer your question?"

She summoned her courage. "Still," she said, "if they're so advanced, wouldn't they have computers or something to compensate . . . ?"

Marsh adopted the air of a patient teacher to a particularly dull child. "The Roswell event—the only confirmed crash because the craft and the remains of the aliens and their human passengers were recovered—was likely due to an equipment malfunction or to pilot error. We've manufactured automobiles in this country for over a century, but there are still fifty thousand deaths each year on our highways." He spread his hands. "Accidents happen, Debbie, even to aliens."

This was followed by a scatter of clapping from the assembly of the faithful.

Marsh's gaze now scanned the circle of chairs. "Does anyone else have a question before I go on?" He paused to look down at some note cards. "If not, I'd like to discuss the eight decades of Air Force cover-ups. . . ."

I raised a hand. "Mr. Marsh!"

He shielded his eyes and squinted out at me through the bar's smoke and gloom. "Yes?"

"Sam Roscoe, Mr. Marsh. We spoke on the phone."

"Oh . . . yes," he murmured, then turned to his audience. "Ladies and gentlemen, please excuse me for just a few moments." He pocketed his index cards and walked over to me.

I offered a hand. His was cold and limp, and he smelled of sandalwood cologne. "A pleasure to meet you," I said.

"I have very little time, Mr. Roscoe, as you can see. I'm meeting my fiancée, Miss Roderick, for dinner and I'm in the midst of an invited lecture. Please be brief." At close range and in the dim light he looked a bit cadaverous. The black pants and turtleneck did nothing for his image, I decided.

"Ah, well, what I have to say should interest you both. Perhaps you would let me buy you both dinner."

He went for it and walked back to his

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audience. I headed for the bar where the bored-looking bartender was polishing a row of wineglasses. "What's a Death Star Special?" I asked, noting the chalkboard behind him.

"Raspberry daiquiri," he told me.

Pamela Roderick walked in a few minutes later. She was dressed in knee-length green satin and carried a jeweled handbag. She looked overdressed for this place, so I guessed we'd be eating elsewhere. Reggie was still talking, waving his hands and occasionally pounding on the podium or whatever it was, so I stood up and introduced myself as Samuel Roscoe, a cable television producer.

"I saw your appearance on the *Jack Ratt Show* tonight," I said. "It was very impressive."

"Thank you. That was taped two days ago." The trace of a smile played on her lips. "Reggie is camera shy, so I have to front for us. Besides, he always seems to be tied up with that organization."

"The CIAAP, you mean?"

"Are you a member?"

"Well no," I said, "but I may be joining. I'd certainly like to hear more about it. The fact is I'm quite interested in your book."

She was young and smart and beautiful. We sipped at raspberry daiquiris on two barstools and talked about the Voynich manuscript and the Albingensians and flying saucers. I told her I was developing a cable program that involved interviews with some of the descendants of the returned humans.

Reggie finally wrapped things up with the true believers and we adjourned to a French bistro a block and a half away.

Gourmet en Bas was tucked away in a basement with small ceiling-high windows that would give you views of pedestrians' shoes at lunchtime. The cellar atmosphere was accented with working steam pipes hanging from the ceiling that clanged and hissed at random intervals. The small, square tables all had white tablecloths and dripless candles in empty half-bottles that had once held first-growth Bordeaux.

"So, Mr. Roscoe," Marsh said off-handedly, without looking up as he perused the menu, "what have you for us?"

I had been working on my story. "I met a man on a recent trip to France," I said. "He professes himself to be the descendant of ancestors who were returned to Earth in 1530 or thereabouts. He claims the Voynich document was composed by them and a dozen or so others around that time, but was stolen."

Reggie looked up from the menu and arched his eyebrows, making a washboard of his brow. "Indeed?"

"By Edward Kelley, the English mountebank magician, who then sold it to Emperor Rudolph II."

Pamela chimed in. "We offered that scenario as one possible route for the provenance of the document. And Reggie has also met—"

"This man you spoke to," Marsh said. "Are you certain he is not a publicity seeker who is trying to capitalize on the popular success of our book?"

A waiter appeared at this point with a towel tucked into his belt and with a pad and pencil poised. Reggie ordered an expensive wine and several appetizers. When we had all ordered and the waiter had left I said: "This man I met claimed that he had never heard of *The Voynich Verdict* when I mentioned it."

"One never knows about these things," Reggie countered, "however, if you'll provide the contact information, I'll check his story out."

I didn't know where I was going with this, so I just started talking. "Actually, I was hoping to use the videotaped interview as part of a television special for one of the cable channels. He's promised me several other contacts of 'repatriated' Cathari that I'm hoping to use as well. I'd like you both to be interviewed also as part of the program."

This seemed to go over like a lead bal-

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loon with Marsh, although I could tell that Pamela was enthused about it.

"We will have to see the footage you plan to use," Reggie said.

"Well, things are currently at a very preliminary stage," I told him. "I'll keep in touch by e-mail."

Little more was said about the matter during the meal. Pamela and I engaged in small talk while Reggie brooded. I caught him studying me pensively several times.

I picked up the tab with a credit card. Poppa Roderick would be footing the bill.

Reggie had a car in a nearby garage and offered to drop us both off. Pamela got out at a fashionable apartment complex and I replaced her in the front seat. I told him I was staying at the Plaza, but he seemed to be heading cross-town. When we stopped at a traffic light I said, "Are you taking Madison?" I thought he was reaching behind him for something in the backseat, and then there was a sharp pain in my arm. In seconds the streetlights started to get blurry. "Hey!" I said, as the car's acceleration knocked me back in the seat. The dash-panel's lights swam like green snakes, then dimmed.

"Goodnight, Mr. Roscoe," I heard him say, and then everything went black.

This part is very fuzzy. I remember a brightly lit shabby office. I was stretched out on a leather sofa. Marsh was there—I'm sure of that—and at least two other men, both swarthy—one tall and bald, one fat and white-haired. They were going through my wallet. Then one of them said, "Let's find out what he knows." I started to get up when a hand caught my shoulder and there was another sharp pain—this time in my neck. I tried to focus my eyes but the darkness started closing in. I desperately looked around, fighting the drug, trying to focus on something: a word, part of a word, on a dropped manila folder on the floor. Somebody rolled me back onto the sofa. And then the blackness closed in again.

I woke up freezing in an alley. My ears were ringing, my head was pounding, and somebody was poking my side. It was a uniformed patrolman and his nightstick was doing a job on my ribcage. I reeked of whiskey. My clothes had been soaked with it, and there was a broken bottle at my outstretched feet. The sky between opposing fire escapes was showing the first signs of morning light.

"I'm givin' you one minute to get up and get moving, or I'm callin' for a patrol car."

I struggled to my feet. They'd put back my wallet and left the cards and money. I walked shakily away with a wave at the patrolman who was watching me, patting his nightstick in his palm. I made it to a corner where I could hail a cab.

I was back uptown by 8 A.M. and I ignored the stares in the lobby of the Plaza. In my room I showered and shaved, then collapsed on the bed for a couple of hours until the maid's tapping at the door got my attention. I yelled to her to come back in a half hour and then dug out some clean clothes, trying to piece things together as I dressed. Who were those guys? I tried to picture their faces, but all I got were blurry images.

I stopped and tried to take stock. This all had to make some kind of sense. I ran down the list of possibilities. One: CIAAP fringers with some kind of loony agenda. Two: government agents of some kind working on some sort of hush-hush project that I had just stumbled into. Three: three was crazy, but what if there really was something to this flying saucer/returned humans business? I didn't see any LGM, but were Marsh's buddies just back from the stars? Whoever they were, they were playing hardball and wanted me scared off and out of their hair. The message, apparently, was next time no more mis-

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ter nice guy.

I studied myself in the oval mirror. I was a little wilted, like the flowers, but decided I'd pass. What I needed was a cup of coffee—maybe three or four cups of very black coffee. I was just about to leave the room when I remembered something—the manila folder. It was a word. I tried to picture it. Four capital letters: S-T-E-G. An abbreviation? An acronym? Somebody's initials? A nickname? I grabbed a notepad from the writing desk and headed for the elevator.

The brisk morning air helped to clear some of the mental cobwebs; the French Roast at a small coffee shop helped more. I sat at the counter soaking up the caffeine and the fresh brewed aroma with the four letters on the notepad in front of me. I tapped at them with a pencil. Stegosaurus? I drew a little sketch of the dinosaur with the twin-row of plates down its back. I needed a dictionary.

I finished a third cup, took another bite out of a half-eaten donut, and headed for the New York Public Library branch at 53rd and Fifth. In the Reference Section, I bypassed the Oxford's twenty volumes and decided on a large Webster's on a stand. I found "stegosaurus" and its related terms: "stegosauria," "stegosaurian," "Stegosauridae," "stegosauroid"—that wasn't helping. Then there was "stegomyia" (the yellow fever mosquito), "stegocarpi" (a type of moss), "stegnosis" (constipation), "Steganopodes" (the pelicans), "steganography" (secret writing). That stopped me cold. From the Greek word "*steganos*": "covered, secret."

I found a bit more in a small encyclopedia:

STEGANOGRAPHY

UNLIKE CRYPTOGRAPHY (SEE), WHERE THE EXISTENCE OF A MESSAGE IS KNOWN BUT UNREADABLE TO ALL BUT CONFEDERATES, IN STEGANOGRAPHY ONLY THE CONFEDERATE KNOWS OF THE EXISTENCE OF THE MESSAGE, WHICH IS HIDDEN WITHIN A PLAIN SIGHT DOCUMENT. NOT TO BE CONFUSED WITH STENOGRAPHY (SEE).

I checked my watch. Pamela's book signing at Barnes & Noble was scheduled for 1 P.M. If I remembered correctly it was on Fifth Avenue about five blocks south. I could get there in ten minutes at a fast walk. It was time to level with her. Her boyfriend was into something that smelled ugly and she was playing a dangerous game. It was time to spit or swallow.

The bookstore was packed with wall-to-wall people. I fought my way past the checkout line at the door and wove through a sea of lunch-hour browsers to the back of the store where Pamela was set up behind a large table stacked with copies of *The Voynich Verdict.* I got in line behind an elderly lady in a faux fur coat who smelled of some old fashioned floral perfume. As I inched forward I noted with relief that Marsh was nowhere around. When the faux fur lady got her book and left, Pamela automatically reached for another volume without looking up. "How would you like it signed?" she said, turning over the flyleaf.

"Live long and prosper," I said.

She looked up, startled, and smiled. "Mr. Roscoe!"

"Pamela, I need to talk to you. Can you get away for a few minutes?"

"Well, I . . ." She looked around at the line behind me.

I lowered my voice. "This is extremely important. My name isn't Roscoe, it's Sanko. I'm a private investigator hired by your father."

She had a little sign that she turned over, "Back in 10 Minutes," then she stood up and led me to a flight of stairs and an empty second-floor office.

I told her everything, including the late night party that her fiancée had arranged for me.

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She was leaning against a steel desk, taking it all in, calmly. She was a cool customer, I decided, or else in deeper than I wanted to believe. When I finished, she sighed. "I guess then I'd better let you in on what's going on." She bit her lip. "It bugs me, though, that daddy hired a P.I."

"He's worried," I said. "Fathers worry."

"Yeah, I guess this all looks like I've got three wheels in the sand and the accelerator floored."

"So what's the real story?"

She brushed back an auburn curl. "It started right after the publication of my first book. I was proud of that. The critics said it was a legitimate piece of sociological extrapolation. Well, the chancellor at Yale got wind of it and scheduled me to deliver a noontime faculty seminar. There was a Dr. Dietrich from the rare book library who came up to me after the presentation. He said he had an acquaintance he wanted me to meet."

"Reggie."

"Yes. You may not believe this, but Reggie can be very gallant." She frowned. "Don't smile, Mr. Sanko. At any rate, Dietrich brought Reggie around to the Chemistry Department and introduced us. He was very charming. We started dating. He gushed over my first book. After a couple of weeks he started talking about the Voynich. Up to that point I was only vaguely aware that it was something mysterious and that we had the original in the Beinecke. Reggie showed me the high-resolution file of images—all 234 pages—that Dietrich had put up on the library's website. Then he showed me an English translation of a treatise that highlighted similarities between some of the Voynich drawings and the secret symbolism of the Albingensians. The author also claimed that the Voynich text was an encrypted form of Flemish. A week later Reggie introduced me to a man with a strange accent, named Jacques de Comines, who claimed to be a descendant of the rescued Cathari. He said the Voynich manuscript had been written by his ancestors upon their return to Earth in the sixteenth century. He said the manuscript's loss, probably by theft, contributed to the fading of the secretly held Albingensian beliefs. As the returned Cathari merged into European society, all that remained was a secret family legend that some ancestors had once lived on another world."

"And you bought this story?"

Pamela bit her lower lip. "Maybe a little, at first. I mean this guy was convincing—straight out of Central Casting. Reggie was enthusiastic about writing it all up in book form."

"So you began working on *The Voynich Verdict.*"

"Well, I began logging time on weekends at the Beinecke, studying the original text and the huge store of studies on it that Dietrich and his staff had collected. The mystery of it was completely fascinating. Reggie worked closely with me on most of that. We began to get serous as a couple for a while, but I . . . well, I learned about his UFO friends and this CIAAP group, and I heard enough to get suspicious."

"So you learned that Reggie was working on a hidden agenda."

She nodded pensively. "Yeah. Mr. Sanko, have you ever heard of the white salmon gambit?"

I shook my head.

"Well, the story goes: there was once this canning company that packed up a load of perfectly good white salmon. There really is white salmon, although today you don't see it much outside of the Pacific Northwest. Well, nobody wanted it because everyone was used to buying pink salmon. A smart marketing man solved the problem with an advertising slogan: 'Guaranteed Not to Turn Pink in the Can.'" Pamela blinked her green eyes. "People—most people—don't believe in UFOs. That's the pink salmon we're all used to. Now suppose

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the alien contacts—some of them—are real, and the aliens don't want their presence known. What better way to cover their trail than to associate themselves with a crazy group like a flying saucer society? That's the white salmon. And the slogan is: if CIAAP says something, everybody knows it can't be right."

"And you believe Reggie is creating a smoke screen for little green men coming and going from somewhere out among the stars?"

She blushed a little. "I've overheard enough to believe that *something* like that is going on. I think only a small core of CIAAP members seem to be in on the conspiracy. The rest of the society are genuine saucer-heads. And another thing—that book we wrote—I once overheard it referred to as a 'cover' for something, some future operation."

I knitted my brows. "If you know all this, why are you going along with it?"

She smiled. "To expose it, Mr. Sanko. For the same reason I said 'yes' to Reggie's marriage proposal. My third book is going to be a solo effort and it's going to blow the lid off this thing, whatever it is."

She amazed me. Money does this to people sometimes—it makes them believe they are invulnerable. "So you're stringing Reggie along to gather information?"

She shrugged. "We're using each other. He needed the prestige of my first book to sell *The Voynich Verdict.*"

Pamela was meeting Reggie for dinner after the book signing, but she agreed to come to the Plaza lobby at 11 P.M. to talk further. In the meantime, I retrieved the rental Merc and drove into Jersey for a talk with Quick Jerry.

It was a small print shop that had once been a local grocery—you could tell from the painted-over sign. He had a long counter with several PCs and a color Xerox; there was studio camera equipment and an offset lithograph in back.

"Steganography, yeah, I heard that term." Quick Jerry squinted little beady eyes at me and rubbed the five o'clock shadow on his jaw. "Invisible ink was the original idea. You, know, lemon juice or something that doesn't show until you warm the paper or expose it to chemicals. The government's still got some classified invisible inks. Some of them are used on the new bills they're printing: But there's a lot more to it than that."

"So what's it worth to you to give me an accelerated course?" I peeled a fifty out of my billfold.

"Put your money away, Sanko. I figure you done for me." Quick Jerry locked the front door and flipped the "Open" sign to "Closed."

"The idea is to hide a message right out in the open where nobody expects there to be no message." Jerry pulled out a bottle and glasses and poured us both two fingers of bourbon. "Ever hear of Herodotus? The Greek historian? Well, anyway, somewhere he claimed that the plans for a revolt against the Persian occupation of Ionia were tattooed on the shaved head of a slave. Re-grown hair covered the message and re-shaving him revealed the plans. That's the idea, anyway." Jerry gulped his drink and thought for a moment. "During World War II, German spies liked to use microdots—like the period at the end of a sentence in some innocent-looking letter—only it's got Allied ship movements or something on the dot, visible under a microscope."

He was getting cranked to the subject. I grabbed a chair and tasted the undiluted liquor. It was rough stuff, but I noted that Quick Jerry had nearly drained his glass.

"Of course there's low tech ways to hide a message—they call it the payload—in the cover-text."

"Cover-text?"

"Yeah, the cover. Could be a laundry list or a page in a diary. The payload

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could be in the shape of the pen strokes or in the way certain letters of the alphabet are formed. Or it could be something simple like the third letter in each italicized word in a long document. There's lots of low tech options."

I risked another pull on the liquor and grimaced at the sear to my esophagus. "So what about high-tech options?" I asked.

"Oh, well now, there's lots of ways to hide stuff in computer files. Ever hear of digital watermarking?"

I shook my head.

"It's just like the watermarks on treasury bills and it was invented for the same purpose: as a way of proving something is genuine or identifying its legitimate owner. Another purpose is what they call digital fingerprinting. You buy something like a downloaded movie and they watermark your name on it so that if you try to make illegal copies, they know who done it."

I didn't quite get it and told him so. "How do you watermark a computer file?"

Jerry refilled his glass and I let him put a splash in mine. "First of all, there's two kinds: visible and invisible. Like in steganography, you don't want anybody but your accomplice to know it's there. You can do this with text and music files, but mostly it's graphics." He took a swallow and looked for recognition on my face. "See, with steganography you want the payload to be hard to detect, so you bury it in the least significant digits of the graphics bitmap."

I gave my throat another trauma with a swallow. "When did you become a computer geek?" I said. "Slow down for us old-timers who still count with their toes."

"Okay," he said, "say we've got a graphics image with 8 bits representing the value of each red, green, and blue pixel." He grabbed a sheet of paper and the pencil stub that he kept behind his right ear. "Say the red pixel value at some location is 11101110—that'd be one of 2^8 possible values. Now I can use that last digit for my payload because you're not going to visually tell the difference from 11101111. We do the same for every red, blue, and green pixel in the file, and we've embedded the payload in what they call the noise floor of the graphic, and nobody's the wiser."

"So how does your buddy, your confederate, read out the payload?"

Jerry rubbed his stubble. "Well, if you had the original image you could just take the difference of the two files, or you can apply a logical operation that removes all but the last couple of bits from the graphics file. That would give you a dark, probably black, screen. Then you brighten the image, say a hundred-fold, and the payload should be visible."

"How easy is this watermarking or message hiding to do?"

Quick Jerry spread ink-stained palms. "Piece of cake now. There's commercial software that'll do it. In fact," he lowered his voice, "I got some. It makes visible watermarks, but I've been fooling with it to add the no-show kind. See, the trick is to work with big files. It's easier to hide stuff on a twenty-acre farm than in a pocketbook. So high definition pictures are best—say twelve or fifteen kilobytes. Nowadays most graphics files are compressed. Ever hear of JPEG?"

I shook my head again.

"Joint Photographic Experts Group. A JPEG compression will save a lot of space on a computer, so you can get a pretty decent looking picture in about two kilobytes. Naturally it's harder to hide a payload in two kilobytes than in fifteen, but its tried pretty often. Say you got a black and white text payload hidden in a JPEG color image. An expert in steganalysis—and the Feds have got a lot of them—would be tipped off by distortion artifacts caused by the compression of the high contrast letter edges in the payload."

An idea had dawned on me. I drained my glass and coughed. "That modified software you've got—can it be used to

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read out any payload?"

Back in my room at the Plaza I loaded Quick Jerry's DVD into the laptop and got on the internet. It only took a minute or so to find the Beinecke Library website and to locate the Voynich Manuscript. All 234 pages were there in high-res files. I had to download one file at a time and apply the "Read Watermark" algorithm.

The first fifty-eight pages gave me blank screens. I was getting sleepy and bored. Outside the room's balcony doors evening was settling on Central Park and I was on my third Heineken. The next file showed a grotesque plant, like a nightmarish sunflower, accompanied by a half-page of Voynich glyphs. This time when I clicked on the "Read Watermark" button what looked like a blueprint appeared. I had finally hit pay dirt. Suddenly, I was wide-awake. I used the "Zoom" button to pick out some details. It was clearly some kind of chemical manufacturing plant. I saved the image.

This was going to be a long haul, so I ordered dinner and a pot of black coffee from room service and began plugging away at the rest of the Voynich files.

It took a long time to slog through it all, but I located five payloads at random places throughout the 234 pages. All were diagrams of chemical plants from various locations throughout the United States. Nothing in the cover-image seemed to be a clue that a particular page contained a payload.

Then *The Voynich Verdict* caught my attention where I had tossed it on the nightstand. I picked up the copy old man Roderick had given me and started thumbing through it. There were about twenty illustrations of Voynich manuscript pages, including the five that held payloads. A confederate would only have to check those twenty instead of the entire Voynich record. And if Dietrich—and I assumed it was him—periodically changed the payloads, he could pick a different subset out of the twenty each time to avoid anyone stumbling over the pattern.

I was finishing the last dregs of the coffee and starting to feel the jitters of a caffeinated hangover as I looked through the Manhattan phone directory for the number of the local FBI office. I was just reaching for the phone when it rang.

It was Pamela and her voice sounded tense. "Mr. Sanko, I came a little early. I'm in the lobby downstairs."

"Is something the matter?"

"I . . . I'm not sure," she said. "Reggie got a call during dinner. It sounds like you were followed today."

"I'll be right down." I hung up and quickly dialed Quick Jerry's number. There was no answer.

Pamela was sitting in an avocado green upholstered chair that contrasted nicely with her burgundy dress. She was fidgeting nervously with her pearl necklace. I sat down on the matching ottoman and looked into her green eyes. She was agitated, I could see. "What's going on?" I said, forcing a relaxed tone I didn't really feel.

She shook her head and bit a corner of her lower lip but remained silent, looking down. She glanced up at me, then quickly looked away. I scanned around the lobby. "Were you followed?"

This normally articulate young woman seemed at a loss for words. I noticed a cocktail lounge off of the main lobby and shepherded her over there and into a leather booth. "Pamela," I said, trying to settle us both down, "You've got to tell me what you know. I've found some nasty stuff that your boy and his friends have been up to!"

Pamela opened her mouth. I thought it was to speak, but the sharp pain in my neck cancelled the idea. She narrowed her brows at me, then looked away.

I spun around and a tall, bald man who looked vaguely familiar was standing behind my right shoulder. The

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leather booth started to sway a little. Pamela was biting her lower lip and Reggie materialized from the gathering fog, looming over us. "You haven't met Dr. Dietrich and Mr. De Comines, have you?" he said. I looked back and the short, fat, white-haired guy had joined the party. "Gentlemen," Reggie said, "may I introduce Mr. Roscoe—or is it Mr. Sanko? I'm terrible with names." Reggie slipped into the booth next to Pamela and gave me a toothy grin. "I must confess you've made yourself a bit of a nuisance."

"Who are you working for, Marsh?" I was trying to focus on his blurring image.

"Why, myself, Mr. Sanko. I'm just a struggling small business owner with a small staff." And he indicated the two Mutt and Jeff types.

I blinked at the blurring row of bottles behind the bar. The room was starting to spin. I'd been suckered by Pamela. Was she a willing accomplice? "Those chemical plant blueprints," I spat out, "who are they for? Some fun group that would like to arrange a series of national disasters?" Dimly, I realized my voice was weak and slurred.

Reggie adopted a mock confidential tone. "Actually, Mr. Sanko, we are just middle-men in the communications business."

"Mitt'l men?"

"I really think you've had too much to drink tonight," Reggie said. "Perhaps a brisk walk in the park will clear your head. Gentlemen, I'll need your help. Wait here for us, Pamela. Have a glass of wine, you look distraught."

They lifted me by the shoulders and walked me, rubber-legged, out of the lounge and across the lobby.

I saw Reggie shake his head at a questioning look from the uniformed doorman. "Too much," he said and indicated drink with a thumb tipped to his mouth. The doorman smiled.

We crossed the street somehow and suddenly we were immersed in the dim verdure of Central Park. Whatever they were using on me made the lampposts shimmer, but I was keeping the blackness away, probably with the help of that pot of hotel coffee.

"Who are your clients, Reggie? North Korea? Al Qaeda?" It was my voice but it sounded strange and far away.

"Mr. Sanko, you're getting much too loud. I'm afraid we're going to have to seek some privacy." With that we turned off the asphalted path to a narrow trail that led off into dark undergrowth.

"Your loony fringer background . . . and that crazy linkage . . . to the Voynich were just enough to put it all beyond . . . 'spicion."

"You are very discerning, Mr. Sanko," I heard Reggie say, very close to my left ear. "It is unfortunate that you didn't take our little hint to stop meddling. . . ." I sensed that he was reaching for something—a syringe or a gun.

I swung back both elbows with everything I had left and felt them connect. Then I was running at full tilt through a phantasmagoric blackness. Branches and tree limbs like claws swiped at me as I wove through a barren stand of trees and bushes. Suddenly I saw the dim outline of a wall of some sort and somehow scrambled up and over it. My head was spinning. I hugged my knees, my back against the stones. My breath was so loud I was afraid they could hear it.

Pounding feet approached on the far side of the wall. "He's here somewhere," someone said. I fought back a wave of vertigo and nausea. There was a close metallic snap, like someone releasing the safety on a handgun. I was frozen in place. This might be it, I thought. *One, two, three—you're gone, Sanko—bang!*

Then: "Police officer! Drop the gun!"

They got Reggie and Dietrich dead to rights. De Comines had slithered back to the asphalt, but a second prowl car picked him up when he started running.

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Pamela had called 911 from the lobby of the Plaza. Apparently, Reggie had placed too much confidence in his purported charm. Quick Jerry was okay, I discovered. He had called the cops too, after a visit from the trio.

It turned out that De Comines was the contact man for a mole in the security division of the Chemical Manufacturers Association. He provided Professor Dietrich with the confidential blueprints. They included details of in-place security systems of chemical plants in high population areas that used and produced some pretty nasty stuff. The FBI and Homeland Security were involved now and Reggie and his little team had a dance card that was full.

I phoned Pamela's old man and gave him the whole story. He barked at me a couple of times because I was wasting his time with details. When I told him the wedding was off and Reggie was under indictment, it sounded like he wanted to kiss me over the phone. He offered me a nice bonus and, while he was in the mood, I got him to agree to have a check mailed to Quick Jerry for "training expenses."

It was the next afternoon. Pamela had agreed to meet me at the little coffee shop a block and half from the Plaza.

"I was worried about Quick Jerry," I said, stirring a cup of Mocha Java. "When they roughed him up, he was forced to tell them about the doctored watermark program that he gave me. When they left, he phoned the police. He must really have gone legit."

Pamela took a dainty bite of a croissant. "I think you had your doubts about *me*," she said.

I shrugged. "We were both lucky that your boy Reggie didn't."

"Reggie was one of those men who need to believe that they're irresistible."

I stifled the urge to make a smart crack. "So what are your plans now?" I asked.

"I got a call from the publisher. News travels fast—they've cancelled the rest of the book signing tour. And I don't suppose I'll be writing up this sordid tale since the papers will be full of it. I might just see if Professor Janeway could use another postdoc."

I sipped at the rich, black coffee. "You're putting the Voynich behind you?"

"No," she said. "When you look into a mystery that deep, it doesn't let you go until it's solved. I'll be working on that until I crack it, or until I'm too old to care anymore."

"So you still think it might not be a red herring dreamed up by some long-dead con artist?"

"Wrong metaphor, Mr. Sanko." Pamela smiled coyly around her raised cup. "You want to believe it's a meaningless hoax—that's pink salmon. The Voynich is saying there are more things in Heaven and Earth than are dreamt of in your philosophy."

"That's *Hamlet.*"

She laughed. "No, Mr. Sanko," she said, "that's white salmon in the can."

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Science Fact

Nuclear Autumn: The Global Consequences of a "Small" Nuclear War

Richard A. Lovett

It started with a pair of nuclear suitcase bombs, exploding simultaneously in Bangalore and Islamabad. Nobody knew who was responsible, but India blamed Pakistan and Pakistan blamed India. For a few horrifying hours, the two countries hurled nuclear weapons at each other, until, by the time cooler heads finally prevailed, dozens of bombs had been detonated by each side.

They weren't large as such weapons go—their total explosive power was only 0.03 percent of the world's entire arsenal—but they were big enough. The first day's casualties rivaled those from all of World War II and the fallout dwarfed that from Chernobyl and Hiroshima. But worse was yet to come. Within weeks, the global climate shifted. Europe, Russia, North America, Australia, Chile, Argentina all saw massive crop failures—not just the first year, but the next, and the one after that as well. It wasn't the end of the world, but the famine, panic, and ensuing chaos launched a global dark age: all from a war between regional rivals whose nuclear stockpiles were small by superpower standards.

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If that scenario sounds familiar, it's because something similar was proposed (and hotly debated) in 1983 by a team of scientists spearheaded by the late Carl Sagan. That team, whose initials led them to become known as TTAPS (for Turco, Toon, Ackerman, Pollack, and Sagan), dubbed their theory "nuclear winter" and posited that smoke from fires ignited in a nuclear war between the U.S. and the Soviet Union would darken the sun and plunge temperatures below freezing across much of the globe.

Unfortunately, the climate models of the era left a lot of margin of error, and while Sagan's team stuck to their general findings, they would later admit that they'd made some mistakes in the details. In particular, in the aftermath of the first Gulf War, Carl Sagan predicted that smoke from Kuwaiti oil well fires would have global consequences: something that didn't happen.

Sagan's team, however, was modeling an all-out nuclear war between two superpowers, in which hundreds or even thousands of enormous bombs were used by each side. (In one scenario, the total explosive power was 5,000 megatons.) With the end of the Cold War, the risk of such a holocaust receded, and so, it seemed, did the risk of nuclear winter.

But now, a new team, led by two members of the original TAPPS team, believe that this relief was premature.

In a series of papers presented at a 2006 meeting of the American Geophysical Union, these scientists wondered what would happen in a smaller nuclear exchange between any of the world's emerging nuclear powers. Nobody knows how such a war would play out, but if you're a small nuclear power with a serious grudge against a neighbor, you're likely to use your arsenal primarily against cities—especially if you have only a limited number of relatively small bombs ("small" defined as approximately the power of those dropped on Hiroshima and Nagasaki).

It turns out that the global effects from even a limited exchange of such bombs might not be vastly different from those of the monstrous H-bombs the U.S. and U.S.S.R. once aimed at each other.

Partly that's because we have better atmospheric models today than the TTAPS team did twenty years ago, allowing us to examine in more detail the way large smoke plumes behave in the atmosphere. But it also turns out that you can set an enormous fire with a relatively small bomb. When it comes to destroying a city, says one of the original TAPPS members, Richard Turco,[1] "a megaton-scale weapon is simply overkill."

Another factor is the incredible population density of many developing-world cities. "We're growing megacities all over the world," says another member of the original TTAPS crew, Owen Toon, an atmospheric scientist at the University of Colorado at Boulder. "Tehran has 10 million people."

Turco and Toon estimate that an exchange of fifty Hiroshima-scale bombs apiece by Pakistan and India could easily kill twenty million people—and that's not counting the effects of fallout. Even a single bomb hitting a country such as Argentina, Brazil, or Egypt could inflict a hundred times as many casualties as any of these countries experienced in all the wars they've ever fought, Toon adds.

It also turns out that smaller bombs are nearly as effective at setting fires as their megaton cousins. One Hiroshima-sized airburst (fifteen kilotons) would ignite everything in a five-square-mile region, says Turco. And that's not even taking into account the fact that the fire would presumably spread, since putting it out would be well nigh impossible.

Conventional explosions set fires directly, from the heat of the blast. But a

[1] Turco is an atmospheric scientist at the University of California, Los Angeles.

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nuclear explosion also produces an intense pulse of blinding light radiating in all directions. "It's like bringing a piece of the Sun close to the Earth," says Turco. "It's that which creates these extraordinarily intense firestorms such as occurred at Hiroshima."

Any city has a lot to burn. A crowded megacity has an enormous amount of potential fuel. Turco estimates that industrialized cities have about ten tons of combustible material per resident. In the developing world, good figures are harder to obtain, but five tons per person is a good estimate, he says.

To give even an inkling of the type of fire that would be ignited, Turco turns to the blaze that roared through San Francisco in the aftermath of the 1906 earthquake. When the earthquake occurred, author and journalist Jack London was on his ranch, well to the north. He rushed to the city and watched in horror from a boat on San Francisco Bay. Even though the day was dead calm, the rising flames drew air from all sides. "East, west, north, and south, strong winds were blowing upon the doomed city," he wrote. "The heated air rising made an enormous suck. Thus did the fire of itself build its own colossal chimney through the atmosphere. Day and night this dead calm continued, and yet, near to the flames, the wind was often half a gale, so mighty was the suck."

In essence, the fire, once started, would fan itself, gaining intensity and blasting a roaring column of smoke far into the sky.

In a modern city, more than wood would burn. Gasoline storage tanks, asphalt shingles, automobile tires, and plastics would also contribute. And all of these are extremely smoky. This was a factor in the 1980s, when the original TTAPS model was constructed. But since then, Turco says, production of plastics has doubled, worldwide. And it's not just an industrialized-world phenomenon: the developing world is rapidly catching up.

To estimate the potential amount of smoke released in a nuclear exchange, Turco's team borrowed the terminology of forest-fire fighters, calculating the "fuel loading" of the fifty most densely packed areas in several countries that might someday be nuclear targets. And while smoke (especially from burning plastics) has many constituents (including such toxics as dioxins, furans, PCBs, arsenic, lead, and benzo(a)pyrene), the group focused only on the sooty, sunlight-blocking ones. From the fuel loading, the mix of fuels, the fraction of material likely to burn, and the amount of soot each material produces, they concluded that about 40% of the soot would come from burning wood and paper products, 15% from plastics, 15% from asphalt roofing, and 30% from petroleum and petroleum products. All told, they calculated that an exchange in which both sides used fifty Hiroshima-sized bombs would produce between one and five million tons of smoke, per country.

To put that in perspective, Georgiy Stenchikov of Rutgers University compares it to the amount of smoke produced by one of Canada's worst forest fires. Called the Chisholm Fire, it raged across central Alberta in May 2001, blackening a quarter-million acres of timber, and producing a smoke plume that spread from Hawaii to the Norwegian Arctic. It was the most dramatic forest-fire plume ever seen and towered to an elevation of seven to eight miles: high enough to reach the lower stratosphere. But it only produced only five *thousand* tons of smoke. To match the hypothetical 100-Hiroshima war, it would have to have burned an area larger than the state of California.

That's a vast amount of smoke—made all the more significant by the fact that it doesn't actually take all that much smoke to darken the sun significantly. "It's highly efficient stuff," says Turco.

Self-Lofting Plume

Another new discovery is that when

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this soot reaches the atmosphere, it will "self loft" to ever-higher altitudes.

That's not the case for smaller fires. Their smoke plumes will rise a few thousand feet into the sky but won't break out of the "boundary layer"—the portion of the Earth's atmosphere that is most directly affected by events at the surface. Even the Kuwait oil fires didn't get through the boundary layer, which is why their effects were limited to the Persian Gulf region.

But nuclear-spawned fires would be different. The dense, black smoke would rise in a two-step process. First, the raging firestorms would produce vast amounts of heat—more than a thousand times as much energy as was released by the bomb blasts themselves. That would drive the plume upward, through the boundary layer, where it would spread out in a dark blanket.

Beneath the smoke, temperatures would plummet. When Krakatoa erupted in Indonesia in 1883, there are reports that temperatures beneath its ash cloud dropped by as much as 14°F. There would also be weird weather effects: the firebombing of Tokyo in 1945 reportedly spawned a tornado.

But the main effect is that the energy not reaching the ground wouldn't simply be reflected back into space: it would be absorbed by the black cloud. This would cause the soot to remain warm, rather than cooling and sinking back to the lower atmosphere.

In a small fire, the smoke would nevertheless disperse and start sinking around the edges. But in a big one, a cloud of sun-warmed smoke would rise ever higher until it punched though the top of the lower atmosphere, into the stratosphere. The effect would be worse in southern countries, such as India or Pakistan, where intense, low-latitude sunlight would more easily heat the smoke. The reason the Kuwait oil fires didn't do this, Turco says, is simply that impressive as they were, they were too spread out and weren't individually intense enough for the self-lofting effect to come into play.

Deathly Pall

Once in the stratosphere, the smoke would continue to rise. It would also be caught in high-altitude winds such as the jet stream and whisked around the world. Within a month, says Alan Robock, also of Rutgers University, a thin haze would girdle the entire planet.

When Mt. Pinatubo erupted in the Philippines in 1991, it blasted enough sulfuric acid into the stratosphere to create a bright haze that not only caused spectacular sunsets, but produced a noticeable dip in global temperatures. Due to the nature of volcanic gases, the Mt. Pinatubo effect lasted only a year. But the effect of the soot would be longer lasting and several times larger, says Luke Oman, another Rutgers scientist.

Overall, he and Robock calculate that the average global temperature would dip by more than 2°F and stay below normal for a decade. Rainfall would also decline, by about 10%.

Two degrees doesn't sound like much, but it is more than the cumulative effect of global warming since the dawn of industrial civilization. It's also substantially bigger than the climate change that set off the "Little Ice Age," which lasted from the sixteenth to the nineteenth centuries and led to Hans Brinker skating the canals of Holland, glaciers advancing across Swiss farmland, and New Yorkers (on at least one occasion) walking across the ice from Manhattan to Staten Island. It would, Robock says flatly, be a global climate change unprecedented in recorded human history.

This doesn't mean it would be a full-fledged nuclear winter. Rather, the scientists are referring to it as nuclear "autumn."

Nor is there any threat of a renewed ice age, little or otherwise. What a nuclear autumn would do is wreak havoc with growing seasons, particularly in re-

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gions like Europe, Australia, or the American Midwest, where, in the heart of large continental areas, the summertime cooling effect would be unusually strong—higher than 5°F in some places. As a result, Robock estimates that these countries could see their growing seasons reduced by ten to thirty days—a major effect, because farmers wouldn't have planted the right crops for the new conditions.[2] Even in the tropics, he says, the change in temperature would strain agricultural productivity.

The Earth's ozone layer would also suffer. That's because the soot would absorb sunlight, substantially increasing the temperature of the stratosphere.

Most people think the atmosphere gets steadily colder as you go higher. But that only applies close to the surface, in the narrow band of altitudes that we inhabit or fly through on airliners. Higher up, the thin air warms substantially, until at the top of the stratosphere, fifty kilometers or so above the surface, its temperature has climbed back close to the freezing point.[3]

The soot, however, would rise all the way to the top of the stratosphere, continuing to absorb sunlight. The result, says Michael J. Mills of the University of Colorado at Boulder, is that the temperature there would increase by 180° F.

All of that extra heat would induce chemical reactions that would wreak havoc with the ozone layer, reducing it, Mills calculates, by a global average of 20-25% for at least 3.5 years. "What we have, basically, is a global ozone hole," he says.[4]

At the mid-latitudes, including the U.S., the drop would be higher: 30-40%. At the poles, it would be 70%. The result would be a substantial increase in the amount of ultraviolet reaching the surface—important, Mills says, not only in the U.S. and Europe, but even in the tropics, because plants and animals everywhere are adapted to the levels of ultraviolet they normally receive.

Winter Still Possible

Nor, the scientists noted, are we free of the specter of a full-fledged nuclear winter. Using today's far-better climate models, Robock reran the original nuclear winter scenario, which involved many times more nuclear firepower, but (due to the overkill effect) only about thirty times as much smoke as the hypothetical Pakistan-India war.

The effects didn't turn out to be thirty times as bad, partly because beyond a certain level, the smoke begins to block itself, so that each new soot particle has less impact. But they were bad enough.

One of the questions raised by critics of the original TTAPS study was whether it was overstating things to call it nuclear "winter." Now, the scientists are sure that it really would be. In substantial parts of the world, the temperature would quickly drop below freezing and stay there for more than a year, Robock said. On average, the revised model found that a nuclear exchange producing 150 million tons of smoke would initially drop the global temperature by 14°F, and still be holding it down by 7°F, a decade later. An exchange producing fifty million tons of smoke would have about half that effect.

"This is new," Robock said. "The effect went on a lot longer than we thought."

* * *

[2] For maps of these and other predictions, including an animated depiction of how the smoke would spread in the days, weeks, and months after an India-Pakistan exchange, see http://climate.envsci.rutgers.edu/nuclear.

[3] It gets hotter yet in the higher layers, one of which, revealingly, is called the thermosphere.

[4] The heating of the stratosphere would also increase the amount of water vapor it can contain, also altering the upper atmosphere's chemistry.

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At the other end of the scale, nobody knows what would happen if a pair of regional enemies exchanged only twenty-five bombs, each, or ten, or five. A lot would depend on where the bombs were dropped. Besides, the scientists don't want to find themselves saying something on the order of: "Fifteen bombs are okay, but sixteen aren't."

What they will say is that a lot of countries have the ability to make bombs.

Right now, there are eight known nuclear powers: the U.S., Russia, Great Britain, France, China, India, Pakistan, and (apparently) North Korea. Israel is widely presumed to have nuclear weapons, and several members of the former Soviet Union once had them, but gave them back to Russia. South Africa was also once a nuclear power, but says that it subsequently dismantled its weapons.[5]

But that's just the beginning. A total of about forty nations have the requisite materials on hand in their nuclear power plants to make from one to 10,000 bombs, Toon estimates, and some, like Japan, could produce weapons in a matter of weeks or months, if they were ever inclined to join the nuclear club. Most of Europe is on the list, but it also includes South Korea and economic rivals Brazil and Argentina. "Fifty weapons is not a challenge for a country to make," Toon says.

"We are at a perilous crossroads, not a declining threat," he adds. "Taken together, the current combination of nuclear proliferation, political instability, and urban demographics poses perhaps the greatest danger to society since the dawn of humanity."

Right now, he continues, we face a future in which there could be a great many nuclear powers, "all as dangerous as the Soviet Union used to be."

During the Cold War, popular novels and movies bearing many of the trappings of near-future science fiction did much to shape a generation's attitude toward the threat of nuclear annihilation: *On the Beach*, *Alas Babylon*, *Failsafe*, *Dr. Strangelove*. Perhaps the time has come for science fiction writers to again sound the alarm.

Meanwhile, Turco sees diplomacy as the best long-term solution. "We've lost the nonproliferation regime which was more or less holding," he says.

"Only disarmament can prevent the possibility of a nuclear environmental catastrophe," Robock adds.

But Steve Schneider, of Stanford University puts it best. During the Cold War, the rest of the world waited with bated breath while the two nuclear superpowers threatened each other with mutual assured destruction and the concomitant risk to the global environment. Now, he says, "the shoe is on the other foot. Nobody can use these things without the effects spilling over to the rest of the planet." ■

[5] A detailed history of this can be found on the website of the Center for Nonproliferation Studies, http://cns.miis.edu/index.htm.

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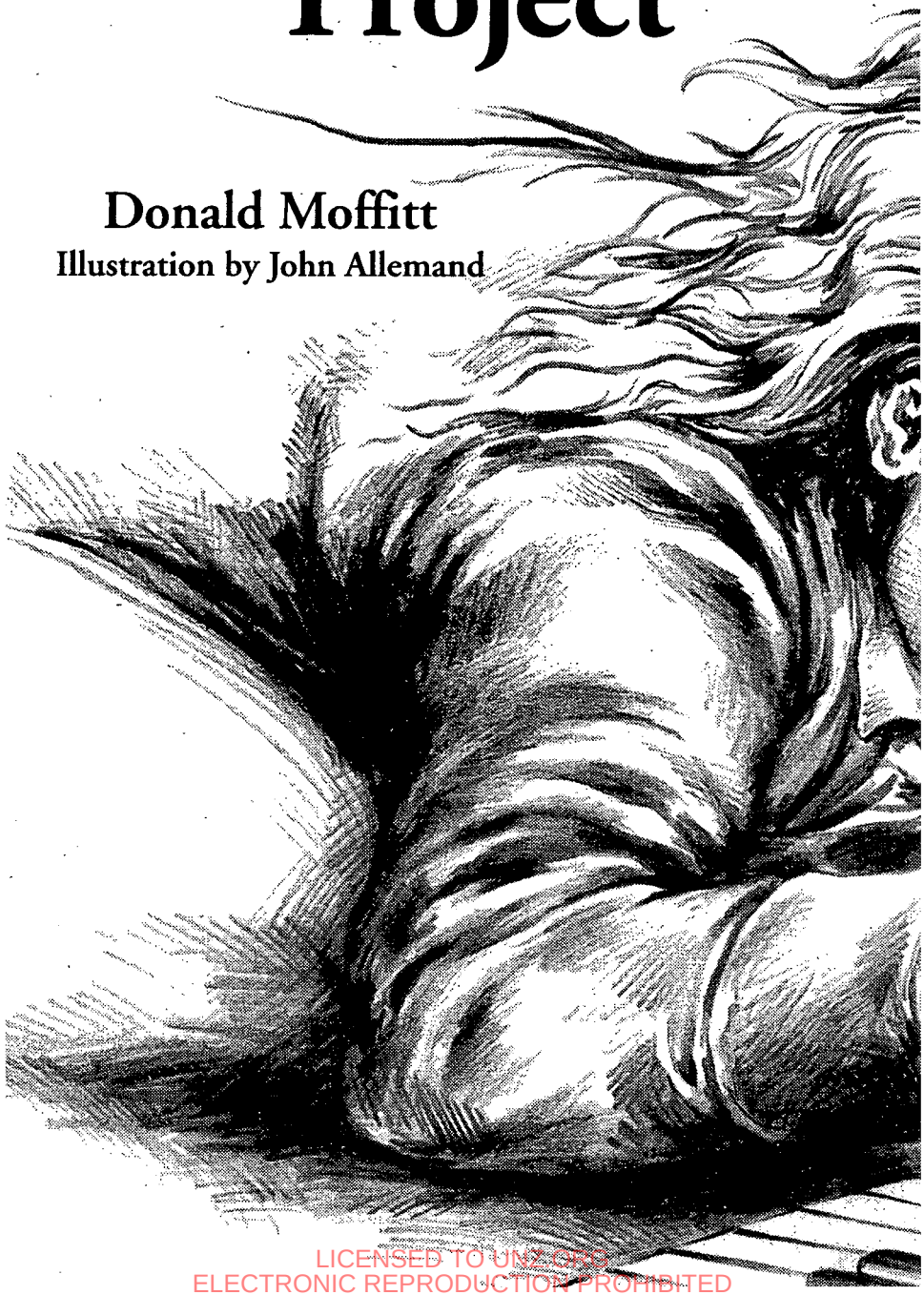
The Beethoven Project

Donald Moffitt

Illustration by John Allemand



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Motivation is everything. . . .

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"Flat," said Harv Saltz, the marketing director for Divergences, Inc. "Sales have been goddamn flat since that Bach thing, what was it?" He snapped his fingers impatiently.

Marty Stent, the firm's creative director, spoke up. "Bach's Variations and Fugue on a tune by Gershwin," he said. It was his riff on 'The Man I Love.' The old guy went crazy with those descending chromatics. We livened it up with just a touch of wire brush, and . . ."

"Yeah, yeah. The point is, we haven't had a hit since then. While The Music Factory, those snakes, have been cranking out hit after hit at our expense. What's the one that's been off the charts all week—'Flipping the Byrd' or something? That was our idea, goddammit, and we dropped the ball."

"They bribed some temporal engineer at Timesplitters Associates to muscle in on a timeline that we paid for," Marty protested. "It was legal because . . ."

"Because we didn't get *our* branch registered before the statutory waiting period ran out, and they were able to file for a new intervention!" Harv shot back. His face was getting dangerously purple.

Lester Krieg sat back and kept his mouth shut. He was painfully aware that he was a very junior account executive, and that he was privileged to have been invited by Marty to a meeting of the big boys. But it was starting to look as if being Marty's protégé might not be an unalloyed blessing.

The sales manager, Larry McGavin, tossed in his two cents worth. "We need a biggie, Marty," he said. "Something surefire."

Harv seconded him with a rumble that Lester interpreted as meaning, "Or else."

Marty was nothing if not quick on his feet. "And that's why I brought in my boy Lester here," he said smoothly. "Lester may be relatively new to the game, but he's impressed me with his creative ideas. And more important, he's a young guy who's in tune with the tastes of the avant-retro generation. I'd like you all to hear what he told me this morning."

All eyes swiveled toward Lester. He shrank in his chair. He hadn't discussed anything with Marty that morning.

"Go ahead, son," Harv said, not unkindly.

Lester thought furiously. "I asked myself," he temporized, "what concept would most strike a responsive chord in literally everybody, not just your ordinary music buffs, but even people with a limited knowledge of music."

He had their attention now. "Go on," Harv said.

"And then it came to me." He swallowed hard, and then it did, in fact, come to him all in a flash.

"Beethoven's Tenth," he said.

They all looked at one another. A murmur of appreciation went round the table. Encouraged, Lester plunged ahead.

"Everybody and his brother Jake knows that Beethoven wrote nine symphonies and stopped there. And even the dimmest of music lovers has wish fulfillment fantasies about what a tenth would have sounded like."

He had them nodding now. Ted Fisher, head of the research department, had started to take notes. Marty caught Lester's eye and signaled him to go for it.

Lester took a deep breath. "Beethoven was always short of money. He conned his publishers. He wasn't above selling the same composition to two or three different patrons if he thought he could get away with it. We know he thought about writing a tenth symphony after he finished the ninth, but he put the project aside for more profitable commissions. All we have to do is make him an offer he can't refuse."

Larry McGavin from sales was nodding his head enthusiastically. "I like it," he said. He turned to Harv Saltz. "What do you say, Harv?"

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The comptroller, Adam Fisk, was putting on that long face of his. "It's going to be expensive, Harv. Opening another timeline, assembling all that cash in gold, reconnoitering expenses, figuring the optimum date for an insert—"

Harv cut him off. "Let's do it."

"An offer he can't refuse," Marty said. "How about it, Ted?"

Lester watched Ted Fisher's face warily. So far, the research director hadn't raised any objections. Not that he could have stalled the project after the executive committee had given it a green light, but he could still throw sand in the gears if he wanted to throw his weight around.

The three of them were closeted in Marty's office with the door closed and all calls on hold. Marty had sent out for lunch, and the wrappings were still strewn about. He had started the meeting by telling them, with a broad smile, that Harv had approved his budget.

Ted shuffled the sheaf of printouts he had brought with him. "We've just done the preliminaries, but as far as I can tell, Lester was right on target. Beethoven was offered three hundred guineas by the London Philharmonic Society for a ninth *and* tenth symphony, but he held out for four hundred. That didn't go over too well, and negotiations stalled. In 1822, they settled on fifty pounds for an eighteen-month exclusive for *one* symphony. That, of course, was the one that turned out to be the ninth, and after Beethoven collected the advance, he turned around and dedicated it to King Freidrich Wilhelm of Prussia, for which he got a diamond ring that turned out to be fake. He also jumped the gun and premiered it May of 1824 in Vienna, before the Londoners even got the manuscript. But the box-office receipts in Vienna were disappointing, and despite further offers from the Philharmonic Society, he gave up on his plans for a tenth symphony and concentrated on string quartets."

"The last quartets," Marty said reverently.

Despite himself, Lester began to have qualms. "Beethoven died in 1827," he said. "We'd be depriving the world of the last five quartets and the Grosse Fugue."

"Not *our* world, kid," Marty said. "Look at it this way. They get the tenth as a consolation prize. We've got the tenth *and* the quartets. Besides, who's to say that he won't knock off a quartet or two anyway, after he finishes the symphony?"

"Beethoven's health started to deteriorate in 1826," Ted said. "Probably pancreatitis, cirrhosis of the liver—you name it! He didn't have much time left."

"What do you suggest, Ted?" Marty asked him.

"The best window would be mid-1824. The ninth was behind him, his health was still reasonably good, and he was taking a break from big projects by writing short piano pieces while he tried to figure out what he wanted to do next."

"The Opus 126 bagatelles," Lester interjected.

Ted ignored the interruption. "So my recommendation would be to hit him then. We know he was at least thinking about writing a new symphony then. He may even have been scribbling a few sketches."

Marty turned to Lester. "That's it then, kid. I envy you. Vienna in June and all that."

"Me, Marty?"

"Who else? How's your German?"

"Okay, I guess. A little rough and ready. My accent's not good."

"Doesn't matter. He won't hear you anyway. How's your handwriting?"

"I don't know if I can pull it off, Marty."

"Don't worry about it buddy. You can pass yourself off as a visitor from the young American democracy. Beethoven ought to love that. Right, Ted?"

Ted put on his sober face. "Beethoven

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was a liberal, and didn't care who knew it. Vienna was turning into a police state with a spy network run by Prince Metternich. Beethoven got away with mouthing off because he was prominent and was considered an eccentric. But Schubert got himself picked up by the secret police for collaborating on an antiwar opera. Based on Lysistrata, of all things. Yes, Beethoven wouldn't mind a visit from an American admirer."

"It's settled then," Marty said to Lester. "Let's get you to wardrobe and then we can sit down and work out a game plan."

Ted put his printouts back in his folder. "I'll get to work on the preliminaries. Lester, you'll have to deposit the funds in gold ducats with a banking house in Vienna. That would probably be Henickstein and Company. I'll let you know."

Marty put an arm around Lester's shoulders. "Let's go, young fella. Time's a-wasting."

The reception room at Alternatives Associates was cool and hushed, with subdued lighting and tastefully framed oil paintings of historical turning points decorating the walls. The receptionist said, "Roy knows you're here. He'll be out in a few minutes. Why don't you gentlemen have a seat while you're waiting."

Lester was in full costume. The clothes from wardrobe were heavy and uncomfortable, and had a musty wool odor that made him itch. The elaborate stock around his neck was too tight, and he stretched it with a forefinger to ease the discomfort.

"I don't understand why we're here, Marty," he said. "We always use Timesplitters."

"Harv says we can't trust them anymore," Marty said. "He thinks The Music Factory has a mole there. Besides, Alternative Associates is cheap."

"They're also pretty new."

"That's why they're still cheap. Wait another year. Trust me, you don't want The Music Factory to get wind of this till it's a done deal."

The door to the inner suite opened and a gangling young man in green scrubs came through. He came over to where they were sitting and said, "Hi, I'm Roy Hendricks, the tech in charge of your project. You must be Mr. Saltz and Mr. Krieg. We've got it all set up for you. Come this way."

He led them down a carpeted corridor to a cavernous area that might have been a conference room or corporate recording studio before Alternatives Associates took it over. Monitor screens lined one wall, and there was a faint smell of burnt insulation in the air. Half a dozen people were working at consoles, but otherwise the room was deserted.

"The way we worked it," the tech explained, "we sent the gold ahead to the place your Mr. Fisher specified, a banking house called Henickstein and Company. Piece of cake. He supplied us with a map and directions. We scoped out the foyer for a few moments when no one was around, and left it in two valises right in front of the door. We did that yesterday, our time, but you'll arrive about a nanosecond after the valises appeared, pick them up like you own them, which you do, and walk right in without a pause. We labeled them with tags that say 'Herr Krieg,' just in case. They're heavy, about eighty pounds apiece, so you'll need that amount in ballast when you return. We'll give you a little pocket mass indicator to take with you. Nothing to it. You just keep tossing away small increments—coins are good—until you get a buzz and a green light."

"He knows the drill," Marty said. "Don't you, Les?"

"I've done a few jumps," Lester said. "But usually the extra mass was recording equipment, and I brought it back with me."

"As long as you understand how it works," the tech said.

"There's one other thing," Marty said.

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"Did our Mr. Saltz say anything to you?"

The tech frowned. "He said something about security concerns."

"Lester here is going to have to stay behind for a few months to baby sit Beethoven until he finishes our . . . commission. Ordinarily, we'd just send him back to a later spot on the branch we split off, to harvest the results of the intervention. But we can't take a chance on . . . someone else muscling in."

"No problem," the tech said. "How much do you know about the Schrödinger Effect?"

Lester could see that Marty had bristled at that, but that he was going to remain faux polite. "Well, a little more than your average layman, Roy. I use it every day."

Roy was faux polite too. He smiled carefully. "I use the elevator every day, but I couldn't tell you how it works. You can look at it this way. As long as Lester remains in his split-off branch of 1824, the channel is anchored here at this end, and nobody else can interfere. Once he returns, that particular universe joins the infinity of other realities floating around in the multiplenum, and anyone can tap into it. Our historian clients do it all the time. Did someone want to see what would happen if the South won the Civil War? No sweat. We follow the trail left in the macroverse by the original intervention and latch on to it at any point we choose. Of course any new intervention creates a new universe. The more the merrier. You can end up in a macroverse of twigs. If the original intervener thinks his experiment got screwed up, he can go back to a slice of time before the branch branched. That's why the time paradoxes that used to be popular in old science fiction stories can't occur in real life. You may go back in time and kill your own grandfather, but in *your* universe, the one you return to, he's still alive and kicking."

Marty turned to Lester with a complacent smile. "In other words, kid, we don't give a damn if The Music Factory horns in on the project after you get back. In our world, we've got the jump on them. By the time they figure out what we were up to in 1824, our product is jumping off the charts."

"What it boils down to," Lester said, "is that I'm stuck in 1824 with the old curmudgeon until he comes through."

"It won't be that bad, kiddo. He could knock off a symphony in a couple of months when he wanted to, and churn out two or three potboilers at the same time. With you there to keep him on the straight and narrow, he'll finish before you know it. In the meantime, you're on the expense account in Vienna, the City of Dreams. You're authorized to draw funds from the Henickstein account for your own use, no questions asked. I'll take care of Fisk."

"All I'm saying is . . ."

"There's no other way," Marty said with finality. "You'll be back in the blink of a quantum eye. Roy and I will be here waiting, just the way you left us. The air you displaced won't even have had time to collapse in the vacuum you left. You can pick up your life exactly where you left it, only with all those golden memories of Vienna under your belt. So grin and bear it."

"You're assuming it's a done deal. Beethoven was a tough old bird to handle."

"Don't get cold feet on me, Lester. This is a great career move for you. You come back with the manuscript of that symphony in your hand, and you can write your own ticket at Divergences, Inc."

Roy Hendricks was looking impatiently at his watch. Across the room, a technician standing beside one of the time booths was trying to get his attention.

"Are we ready, gentlemen?" he said?

Lester paused at the curb to check his map. He couldn't read the house number from where he stood, but it had to be Landstrasse No. 323. A small crowd of idlers was standing in the street, star-

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ing up at a pair of shuttered windows on the third floor. The crowd was generally well behaved, but a trio of louts in work clothes was being unruly, pointing up at the windows and laughing. One of them made some rude remark that sent the other two into gales of laughter, but Lester's grasp of idiomatic German was too shaky for him to decipher it.

He pushed his way into the crowd and joined the gawking. Nobody paid any attention to him. He was close enough now to hear what the others were listening to—an alarming torrent of braying cries and animal howls, punctuated by what sounded like someone banging on an out-of-tune piano.

The strange noises stopped for a moment and he could hear someone shouting angrily. There was a pause for a moment, when someone else must have been replying in a softer tone of voice, then more shouting, another silence, and a resumption of the howling and banging.

After several minutes, a man in a top hat and swallowtail coat emerged from the front door, his face bright red and unsmiling. He took in the crowd, and his lips tightened. *"Geben Sie weg!"* he yelled, shaking his walking stick at them. He zeroed in on the three louts and gave them a piece of his mind. They backed off and left, feigning nonchalance. Several of the onlookers were intimidated enough to follow, but the rest of the crowd stayed put. The top-hatted man gave up and marched angrily off.

Lester in the meantime had figured out who he must be, though he bore only a passing resemblance to the portrait engraving Ted Fisher had shown him—Anton Schindler, the violinist-lawyer who had turned himself into Beethoven's chief groupie and general dogsbody. Lester was relieved not to have to deal with him. According to Ted, he was jealous of the position he had carved out for himself with Beethoven, and could be a pain in the neck.

Mentally crossing his fingers, Lester separated himself from the little cluster of onlookers and strode purposefully to the door as though he had legitimate business inside. Nobody seemed to think it was odd. A bell jingled when he pushed the door open, but no one was in sight. He could hear women's voices and kitchen noises from down the hallway that led to the rear of the house, but nobody came to check on the bell. There was a stairway to his right, and, not hesitating, he climbed up three flights to a dimly lit landing covered in fading wallpaper. From behind the door opposite came the sound of a three-note sequence repeated over and over again on the piano, as though Beethoven were trying something out in his head. Lester winced. One of the notes was flat. Probably Beethoven couldn't hear it. The piano pounding was just his way of working off steam.

Automatically, he lifted a fist to knock, then caught himself. He tried the knob and the door opened. He stepped inside and closed the door behind him.

His first impression was one of awesome clutter. Papers and books were strewn haphazardly about, covering every conceivable surface. A small space had been cleared on one side table for a glass coffeemaker and a few chipped cups and saucers. There was a washstand with unmopped puddles of water on the floor beneath, and an unmade bed in the corner with more papers scattered across it. The room was not particularly large, and no fewer than three pianos crowded it still further. The tops of the pianos themselves were used as catch-alls, and Lester glimpsed a miscellany of objects that included a small ivory bust and several ear trumpets.

One of the pianos had its legs sawed off, so that it rested directly on the floorboards. Beethoven was sitting on the floor in front of it, amidst a rat's nest of crumpled papers, his legs splayed out awkwardly on either side. Lester knew what that was all about from Ted Fish-

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er's briefing; it was so that Beethoven could feel the floor vibrations when he was thumping the piano.

Beethoven's back was to Lester, but he must have sensed his presence, because he swiveled around and looked up angrily.

"Wer sind Sie?" he demanded.

Beethoven looked like an unmade bed himself. A shaggy mane of graying hair stood out stiffly, looking as if it had seen neither comb nor scissors for a while, and his shirt was rumpled and unbuttoned. He looked pretty much like the busts and pictures: a short, broad, muscular man with a wide forehead and the burning eyes of the portraits.

Lester controlled his excitement. He reached past Beethoven and picked up the pencil and conversation book that were lying on the piano. He caught the word *Verzeihung* on the open page; Schindler must have been apologizing for something.

He turned the page and scribbled out: *Ich bin Amerikaner, Herr Beethoven.* Beethoven's eyebrows rose, and he grew more cordial. He passed the book back to Lester. *"Schreiben Sie mehr."*

It went more smoothly than Lester could have hoped for. He explained to Beethoven that he had many admirers in America, and that there was a wide demand for whatever piano and chamber music became available from overseas. Now a truly *amerikanischer* symphony orchestra with the highest professional standards was being assembled in the city of *Neu York* and the subscribers had determined that only a new symphony by the great Herr Beethoven would do for the inaugural concert. They had gotten up a fund and authorized a big advance.

Beethoven perked up at the "big advance," and he invited Lester to sit down. He disposed of the formalities right away, and they started negotiating in earnest. Beethoven was an aggressive bargainer, and kept raising the ante every time Lester thought he was getting somewhere. He seemed to sense that he had Lester over a barrel. Lester knew he was out of his depth when they got to eight hundred florins for the advance alone. At one point, Beethoven claimed that his publisher, Schott, was offering him sixteen hundred florins for a package to include a "great mass" and a symphony, and he did not want to disappoint him. But, he said, if they could reach a suitable—*"Geeignet"*—agreement, he might squeeze in a new symphony for Lester and put Schott off with a few trifles. Lester knew where that was headed. Beethoven could pocket both advances and palm off the same symphony on both of them. In his own sweet time.

"No, no, that's impossible!" Lester said desperately, forgetting himself and speaking out loud. He willed himself to remain calm and resumed writing in the conversation book. The date of the American concert could not be altered. The wheels were already in motion. Time was of the essence. The subscribers had instructed Lester to remain in Vienna until the symphony was finished and to bring the manuscript back to America with him. He would pay to have a copy made for Beethoven's use before he left Vienna. But—and here Lester took a brave leap—he could not release a single pfennig until they came to an ironclad agreement. Like it or not, Beethoven would have to write to a deadline.

Lester sat back and waited for the explosion. And it came.

Beethoven's face darkened. He shouted, "There is only one Beethoven! I am not some tradesman, grinding out sausages! I will not be treated this way! You may take your *amerikanischer* money and—" Here, Beethoven used an expletive that Lester had never heard before, but whose meaning was unmistakable.

Lester waited it out, his heart pounding. Then they started negotiating all over again.

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". . . and good luck . . ." Marty was saying as Lester vanished, and then he broke off as lights began blinking on the monitor board. The booth remained empty, and he turned to Roy Hendricks and said, "I thought it was supposed to be instantaneous."

"It is, in one sense," Roy said. "Lester's just in Schrödinger's waiting room till the capacitors come up to speed again." He squinted at the monitor board. "The mass indicator's right on target. I wonder what he's using for ballast. Sand's always popular. So are jugs of water. Usually in much smaller quantities than your requirements, needless to say. The gold stays in 1824, of course . . ."

The lights flickered. "Ah, here he comes now," Roy said.

Two people, not one, popped into existence in the booth. One was Lester. The other was a short, stocky man with wild hair, wearing a rumpled shirt, baggy trousers, and bathroom slippers. He needed no introduction.

"Lester, what the hell did you do . . ." Marty began, then desisted as Lester shushed him with a warning gesture.

"Herr Direktor," Lester said in stiff, formal German, "permit me to present Herr Beethoven . . ." In a quick English aside, he said, "For God's sake, Marty, try to look important. And stuffy." To Roy Hendricks, he hissed, "No, don't try to shake hands with him. Just bow and look respectful."

Beethoven was peering all around with intense interest. It was impossible to tell how much sense he was making of it. The electronic equipment lining the walls could have had no meaning for him. The office furniture scattered through the staging chamber looked nothing like the heavy desks and solid chairs he would have recognized. And the people sitting in those strange spidery seats, who seemed to be some sort of clerks, had no pens, inkwells, or paper, and scarcely any decent surface to write on anyway. But he was fascinated by the electric lights. His eyes darted from desk lamps to overheads and back again, then fixed on the glowing screens that the clerks were staring at.

"Where's the manuscript?" Marty said sotto voce. "What's he doing here?"

"Later," Lester said. "First we better get him settled. A hotel's too risky. We'll have to use the company's hospitality suite. And fix him up with some clothes. And while we're doing all that, you have to get on the stick and get him an appointment with an audiologist."

Harv had told his secretary to cancel all his appointments. He was alone in his office with Marty and Lester. He closed the door and pulled down the Venetian blinds, and turned around to face them.

"All right, Lester," he said. "You better explain yourself."

Lester was sweating. "It couldn't be helped, Harv. He knew he had me by the marshmallows. I could have gone through the roof on the money offer, but with the advance in his pocket, he would have just kept me on hold when it came to actually delivering the symphony. Even if I'd lied to him about the size of the deposit we made in the Henickstein account, he wouldn't have gone ahead till Henickstein verified the amount. He just kept saying things like 'What is money to a true artist? I am resigned to being a poor man in the service of my art.' And so forth. And then he would go into self-pity mode and complain about having to 'scribble, scribble, scribble for the sake of bread and money.' Believe me, it was a stalemate. I had to get out of the money rut."

He glanced at Harv's frosty expression and took a deep breath.

"So I made him an offer he couldn't refuse."

"But how did you convince him that you were really from the future, and not just another con artist?" Marty said.

They were following the nurse who was pushing Beethoven's wheelchair

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down the hospital corridor, trailing her at a distance and speaking in low tones. Beethoven had been admitted as a "Mr. Pfeffer."

"Magic tricks from the twenty-first century," Lester said. "I had my Palm-All with me. I never travel without it. He couldn't hear the music, but I could show him visuals of orchestras playing and street scenes of the future, with automobiles, skyscrapers, women's bare legs, and so forth. He tried to act cool, but he was pretty shook up. In the end, I got a commitment from him. A 'sacred compact,' as he put it. And of course I'll keep reminding him of who he owes for getting his hearing back."

"I have to hand it to you, Lester. You pulled the rabbit out of the hat. I thought Harv was going to have apoplexy when you asked him to put Beethoven on his own medical insurance. As a visiting relative, no less. He'll end up paying out of his own pocket, of course."

"He can afford it."

Up ahead, Beethoven was being difficult. He was treating the poor nurse to a never-ending stream of invective in German. He didn't like the hospital gown. Why was it open in back? It was indecent. Why did he have to ride in a wheelchair? He was perfectly capable of walking. *Vorsicht!* You are going to bump the wall! You are a dolt! Fortunately, she didn't understand him. She stoked his temper still further by ignoring him, as if he were an unruly child.

The nurse turned into the pre-op room, and Lester and Marty followed her inside. The audiologist who had examined Beethoven was waiting for them with a small computer and a tray full of happy-face stickers. He irritated Beethoven further by speaking to Lester and Marty first.

"I hope you gentlemen can keep him calmed down. I'm going to map the facial nerve for the surgeon, so that he can avoid any damage. It should take about twenty minutes if he's cooperative."

"Is it really gonna work, doc?" Marty said.

"The cochlear implant?" The audiologist pursed his lips. "You're getting a state of the art device—a 1,024 nano-electrode array. Both ears. It's going to be hideously expensive, but I understand that's no problem. The early cochlear implants got good results with as little as an eight-electrode array. By the turn of the twenty-first century, we were up to a sixteen-electrode array, then thirty-two, then sixty-four. Some of the recipients of those primitive versions claimed they were even able to enjoy music again, though the fi couldn't have been very high. I understand that your Mr. Pfeffer was some sort of musician?"

"That's right," Marty said. "Uncle Hans was always the life of the party."

"He got a little crabby after he lost his hearing," Lester added.

"Well, the 1,024 electrodes in the array don't approach the thousands of cilia in a normal cochlea, of course, but they're past the threshold where the brain cares about the difference. The normal cochlea provides analog information to the auditory nervous system, and the brain sorts it out. A cochlear implant provides digital information, already sorted out by its little microprocessor, to whatever remains of the auditory nerve dendrites and spiral ganglion cells, and the brain interprets it as sound." He smiled with professional satisfaction. "Your Uncle Hans should hear as vividly as he ever did, once the brain learns to rewire itself for the new type of input."

"And how long will that take, doc?" Marty said.

"Oh, usually just a few weeks. We'll have to wait until the skin flap over the mastoid bone heals. Then we'll need a couple of sessions to fine-tune the computer program. All done wirelessly, of course, not like the old days when you had to wear an external gadget. Your uncle will need a little patience."

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Lester and Marty looked at each other. They were both thinking the same thing: the security problems of an extended stay in the present.

"Uncle Hans isn't too good with patience," Marty finally said.

"I'm sure it will go smoothly. You gentlemen have been doing fine with him so far."

Beethoven had been stewing while they talked. He erupted with a scowl and a gruff *"Gott macht gesund, und der Doktor bekommt das Geld!"*

The audiologist smiled pleasantly, and motioned the nurse to wheel Beethoven over to the little table holding the computer. She held Beethoven's hands while the audiologist moved a probe over his face, pasting a line of little happy faces to mark the boundaries of the facial nerve.

"What did he say?" Marty whispered.

"God gives us back our health, and the doctor gets the money," Lester said.

When the audiologist was through with him, Beethoven had a visit from the anesthetist. They'd gone through it before, but Marty had to assure him all over again that Beethoven had no history of any problems in that department, and that the cardiologist had cleared him for surgery. Beethoven showed no interest in the proceedings until a phlebotomist arrived to insert an IV. It was no good trying to explain to him what was going on, and he managed to give her a good smack in the chops before they pinned him down. "Murderers, murderers!" he kept yelling, but they held onto him until the preliminary tranquilizer began to take effect. He remarked that he was feeling pleasant, and closed his eyes.

There was no more trouble after that. They stayed with him until an attendant arrived to wheel him to the operating room. The nurse followed, pushing the IV stand. She had scratches and finger marks on her arms, and a glacial expression on her face. She turned at the door and said, "It'll be a few hours. You gentlemen can use the family waiting room."

"We're almost set," Roy Hendricks told them. "Just a few more minutes now."

"Back to Vienna, kid," Marty said jovially. "Don't sweat it. You'll be back here before I know it."

Beethoven was wandering around the staging area as though he owned the place. He was in high good humor, even pausing at a console or two to flirt with the young women stationed there, if his heavy-handed badinage could be called flirting. Now he was standing in front of one of the wall monitors, his hands clasped behind his back, staring at a frozen image of his own apartment, just as he had left it a couple of hundred years ago.

"It was a good move, getting him the piano," Marty was saying. "He didn't like being cooped up in the hospitality suite. It kept him out of trouble."

"Except for the time he got out," Lester said. "It was a mistake letting him have money."

"You can't blame him. He was bored and restless. He liked to take a break in the afternoon and go out to have a beer and read the papers. That piano bar he ended up in was the closest thing to the Viennese taverns he was used to that he could find."

"Yeah, but then he pushed the piano player off the bench and started improvising. The happy hour crown didn't appreciate the kind of music he was playing. If only they hadn't started booing him for not responding to requests. That's when he lost his temper. He was used to being lionized when he was a young virtuoso. God knows what would have happened if we hadn't tracked him down in time."

"But we did. We smoothed things over with the bartender and bought a round for the house, and everybody's forgotten about it by now."

"I don't know, Marty. What if The Mu-

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sic Factory heard about the incident and put two and two together?"

"That was two weeks ago, and there hasn't been any trade scuttlebutt. Relax, Lester. You worry too much. As far as anybody knows, it was just another old drunk who thought he could play the piano. Happens all the time." He glanced over toward Beethoven. "Look at him. He's happy as a clam."

"He ought to be. He's got his hearing back. He can hear himself play for the first time in years. And he can wow his contemporaries again, even if he's hopeless at show tunes and rock."

"That's more like it, kiddo. He owes us now. And he's promised to come across with a tenth symphony this time. I think he's feeling guilty about stiffing you on the advance. He sounded like he meant it when he swore his undying gratitude, or whatever it is in German."

Lester nodded in reluctant agreement. "Immortal *Dankbarkeit.* And then he gave his solemn oath. His *Heiliger Versprechen.* Those were his own words. Unsolicited."

Marty slapped Lester on the back. "See, what did I tell you? Buck up, my boy."

Roy was over at the time booth, unsuccessfully trying to get Beethoven's attention. He gave up and signaled to Lester.

"I think they're ready for us," Lester said. "See you later."

He pried Beethoven away from the wall monitor and squeezed into the booth with him. Beethoven was still in a good mood. He gave Marty a jaunty little wave as he vanished.

This time the delay was imperceptible. Lester seemed to vibrate into a sudden change of posture, like a jerky animation. He was wearing a different suit than the one he had left in. Beethoven had been replaced by a pile of sandbags, topped by what looked like a few souvenir items that Lester must have spent part of his mass budget on.

Roy moved to sever the time line immediately. His fingers flew over a keyboard, and the monitors started blinking like crazy. "Got it," he said.

Lester stepped out of the booth, his arms loaded with a wooden cuckoo clock and other assorted knickknacks from the past. Marty didn't see anything that looked like a manuscript.

"All right," Marty said in a strained voice. "Where is it?"

Lester seemed to have trouble looking at Marty. He stood there, clutching his souvenirs. He cleared his throat and said, "There's been a slight hitch."

"Hitch? What do you mean, hitch?"

Lester cleared his throat again. "Getting his hearing back made him reevaluate his priorities. I mean, when he started to go deaf in his thirties, it sort of threw him off his career track."

Marty grabbed him by the shoulders and shook him. "What the hell are you talking about? Where's the damn symphony?"

Lester dropped the cuckoo clock and tried to bend over to retrieve it, but Marty still had him in his grip.

They were interrupted by a shout from Roy. "Something's happening back at the 1824 junction! You better have a look!"

They hurried over. The blurring scrolling of numbers on the screens meant nothing to them, but Roy tried valiantly to explain.

"Something inserted itself into the plenum about a picosecond before the channel got totally pinched off. There's evidence of quantum tunneling. Whoops! There it goes! The dam just burst! We've got an influx of virtual particles!"

Marty kept his voice remarkably steady. "Roy, will you please tell me what the hell you're talking about?"

Roy wiped a drop of sweat off his forehead. Otherwise his face was neutral. "It means that someone jammed a crowbar into your timeline, and now they're prying it back open again."

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Marty gave Lester a look that could kill. "The Music Factory," he said.

Harv Saltz looked grim. The others gathered around the conference table looked grim too. Except for Adam Fisk, the comptroller. He had an I-told-you-so expression on his face.

"All right, Lester, take it slow," Harv said. "Just explain to us how it happened. First you told us that if we offered Beethoven enough money, we'd have no problem getting an exclusive on his tenth symphony. I believe the expression you used was 'an offer he can't refuse.' Evidently the money wasn't enough. He pocketed the advance you gave him—an exorbitant figure—which bought us some months of inaction, while you lived it up on the expense account."

"It was supposed to be a slam dunk," Larry McGavin put in.

"Please, Larry," Harv said. He turned back to Lester. "Then you bought Beethoven back to our time with you with the promise of a miraculous operation that would restore his hearing—*another* offer he couldn't refuse . . ."

"I was against it," Adam said. "Throwing good money after bad. And quite a bit of money at that. It would have reduced our profit margin on the project to—"

"That's water under the bridge, Adam," Harv said. "In view of the problem we've got now." He aimed his gaze at Lester again. "I've got a meeting with the board next week. They're pretty upset. So tell me again, how is it that you managed to spend another three months supposedly riding herd on him, and still no symphony?"

All eyes were on Lester. He spent a couple of seconds groping for words, then said, "Well, uh, we had what seemed to be his sincere assurances that . . ."

Adam Fisk interrupted him. "But no written contract. And nothing about returning the original advance."

Lester got unexpected help from the guy from legal who had been asked to sit in on the meeting. "A contract would have been unenforceable anyway. A hypothetical future has no standing in a hypothetical past, even assuming that we wanted to make a case out of it."

"It might have helped turn the screws on him," Adam persisted.

Harv rapped the table. "Please, gentlemen! Let him talk."

Lester looked over at Marty for support. No help there. Marty was maintaining a self-protective silence.

"I think he intended to honor his promises," he said ruefully. "But then he got back to his own milieu. He could hear again. And more to the point, he could play the piano again and hear himself play. It must have hit him like a ton of bricks. The first thing he did was to get rid of the out-of-tune pianos with the broken wires that he'd abused over the years. He fell in love with the state-of-the-art Broadwood piano that the manufacturer sent to him when word of his miraculous cure got around. And he started playing in public again."

"I fail to see . . ." someone began.

Lester pressed on. "Don't forget, Beethoven made his first splash in Vienna as a piano virtuoso. He played the salons, he wowed the ladies, he amazed everybody with his ability to improvise. The money was good and the adulation even better. He got to be quite a prima donna. He insulted his patrons and they put up with it. He threatened to break a chair over Prince Lichnowski's head for asking him to improvise for some dinner guests he didn't like. Another time, one of his groupies—a princess—got down on her knees and begged him to play, and he wouldn't give her the time of day. He was still young and feeling his oats when he started to lose his hearing. It was a terrible blow not to be able to do the concerts and private performances any more. He never stopped regretting the life that he lost. Composing is one thing, but playing to a live audi-

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ence is something else."

"Get to the point, Lester," Harv said. "What happened?" He was tapping the table with a finger, a bad sign.

"Right," Larry McGavin growled. "I got the sales force all fired up about this, Lester. Now, all of a sudden, no symphony. What do I tell them?"

"I was getting to that," Lester said. He took a deep breath. "For the first week, nothing on paper. No notes, no sketches, none of the usual scrawls. I nagged him about that, believe me, I did. But he just kept saying he was working things out in his head, and when they firmed up a little better, he'd start sketching out some ideas. He was on the verge of losing his temper, so I backed off. But he accepted an invitation from his old patron, Prince Lichnowski, to play at some fancy soiree. They had an emotional reconciliation, and rumor has it that the prince paid him six hundred florins, his old stipend. Same thing happened a week later, with Prince Lobkowitz. He played the Hammerklavier sonata, and caused quite a stir. Remember, he'd never really heard it himself. Neither had his audience. The pianists of his time thought it was unplayable."

"Very interesting, I'm sure," Harv said. "Get on with it."

Lester looked over to Marty for support, but Marty was sitting there placidly, looking as detached as he could manage.

"Well, then Lobkowitz and Beethoven's self-appointed manager, Anton Schindler, hatched this scheme of a giant subscription concert, Beethoven's Comeback or something. I braced him about it, but he waved me off, saying the symphony ideas were still percolating in his head, and when he was ready, he'd start work. So I figured, let him get it out of his system, and I'll tackle him afterward."

"And?"

"The concert was a huge success. He had to repeat it four times over the next two weeks. It was the talk of Europe, not just Vienna. Beethoven didn't bother to write anything new for it. He just played some of his surefire hits—the Appassionata sonata, the Moonlight, the Pathetique. He filled in with an hour of improvisations—showy stuff, all fireworks and no red meat. The audience lapped it up. When it was over, Beethoven was rolling in dough. Like nothing he'd seen before."

"I presume you—what was it?—'tackled him' afterward?" Harv said with dangerous sarcasm. Several murmurs of assent could be heard round the table.

"He blew me off. It was more of the same. Concerts, private parties, piano lessons for adoring countesses. He was having the time of his life. He wouldn't talk to me any more. The last I heard, he and Schindler were cooking up a tour of France and England. Then Russia."

"Lester . . ."

Lester tried to fend off the explosion. "For God's sake, what was I supposed to do? The man was reborn! He spruced up, got a new wardrobe, got his hair trimmed! He has a girlfriend! A countess!"

Harv's secretary entered the conference room just in time to postpone his wrath. She whispered in his ear and handed him a piece of paper. He read it, then looked round the table with a cold, steely gaze that was worse than an explosion.

"What I feared," he said. "The Music Factory's releasing a new series. 'Beethoven at the Piano: Improvisations from His World Tour.'"

The explosion came, but it was everybody else at the table, not Harv, who looked as if he was simply contemplating murder. They were all glaring at Lester and talking at once. ". . . cooked again, goddammit . . ." ". . . shouldn't have listened . . ." ". . . why didn't you record him yourself . . ."

Lester saw his whole career flashing before his eyes. He tried desperately to make himself heard. "I only had my Palm-All with me . . . who would've thought there'd be concerts . . ."

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It was Marty who came to the rescue. He rapped on the table to get their attention, and when he had it, he spoke with all the calm authority of a creative director coming to the defense of a wayward subordinate.

"Don't be too hard on Lester. Sometimes it hits the fan and there's nothing you can do about it. There's no sense dwelling on past mistakes. We need to look ahead, find a new project that will make Divergences, Inc. numero uno again. And Lester might just have come up with that project. We were talking about it this morning."

Lester knew what a rope was when he was drowning. He squared his shoulders and faced the music. "I asked myself what would grab everybody's attention even if they didn't know much about music. What would compare with the appeal of something like Beethoven's Tenth?"

He paused for a beat while he tried to think of something. They were waiting expectantly.

"And then I had it," he said. "Schubert's Finished." ■

You can always count on the Americans to do the right thing after they've exhausted all the other possibilities.

—Winston Churchill

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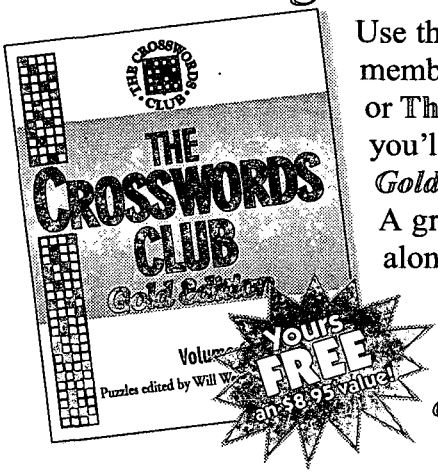

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Amor Vincit Omnia

Craig DeLancey

What's "normal" depends on where on the scale you're looking from....

"Mr. Sumaran? Mr. Allen Sumaran? I want to thank you for seeing me today."

My visitor looked nothing like the kind of low-level bureaucrat that he claimed to be. He was too old and too fit. He appeared in his mid sixties, with short and graying hair, but lean, athletic, as square as the frame of my office door where he stood. Well-muscled arms filled out the sleeves of his conservative blue jacket, a Brooks Brothers generic with two brass buttons and the pockets still sewed shut. It shined as if he'd bought it that morning.

"You're welcome, Mr. Austin," I told him, waving that he should enter. As he approached I saw that he had distinctive green eyes, one with a touch of brown in the iris. I found him imposing and slightly frightening, although I knew no reason to fear him then, and only later did the ghost tell me the truth about him: this man wanted to own me and everyone I loved. This man's goal was the enslavement or the genocide of my secret race.

"Call me Tom," he said.

"Allen." I held out my hand and he shook it fiercely, his grip rough from a callused palm.

"Please sit." I pointed him to a chair as I sat behind my desk. The windows of my Manhattan office covered the wall behind my desk and gave a view both beautiful and distracting, through tall towers and the gaps between air defense spires out to the Hudson beyond. But Austin focused very clearly on me, his piercing green eyes fixed on mine.

"You said you need to talk to me about the Marrion Home," I reminded him.

"Yes." A slight tic showed itself in a

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flinching of his left eyebrow, as if through great effort he were holding something back. "As I said before, I work for the E.P.A. You were raised in the Marrion Home?"

"My parents died shortly after my birth. I was fortunate to be born in Pennsylvania, where it was possible to actually be taken in by the orphanage instead of being shuffled from foster home to foster home. I liked it at Marrion. In fact, I often miss it. It was a good place to grow up."

"I'm sure it was. There were less than a hundred of you there, correct?"

"That's right. Some kind of budget constraints. There were a few classes, and then for more than a decade they admitted no one new. Not until the rest of us graduated, in fact. Why are you interested?"

"Unfortunately, we have reason now to believe that the grounds of The Marrion Home may have been contaminated by some industrial pollutants that are known carcinogens."

"That's terrible," I said.

"Yes, sir, it is." But his intense stare revealed no genuine concern.

"Well, I just had a check-up. My doctor says I'm fine."

He twitched again and forced himself to smile. "I'm very glad to hear that. However, we'd like to check for things that your doctor might miss. Would you be able to stop by the offices of a doctor here in town that is working with us on this problem? He'd like to do some tests on you. Nothing major. Blood tests, mostly."

"Perhaps. If you think it best." I saw no harm in telling him it might be possible. "But it'll take at least a week or two. I am extremely busy, as you can imagine."

"I can. You just became the CFO of Ariel Systems, correct? I read in the paper a few weeks ago that you are expected to be CEO someday. They said you have a great strategic mind."

I had seen the article in the *Journal*. Below a pointillist portrait of me lay twenty column inches of flattery, the usual business press mythology about brilliant executives who deserved their obscene pay.

"I've been lucky, Tom. We guessed at a few long-term trends in bioinformatics and turned out to be right. That made us the market leader."

"Still, you must be very proud," he said.

I resisted the temptation to frown. I had started with grand dreams to reform the corporation, to wrestle it onto a path to do great things, to lead the cure of a thousand diseases, but at best I had just pushed it a tiny way. Each day it grew harder to know if I remained true to those dreams. Our software mostly helped big pharma make the drugs that dominated the market: hair growth tonics or erection cocktails or mood improvements for geriatrics. Meanwhile, the southern hemisphere died of plagues.

I gave him a business cliché. "I'm proud of my team and their accomplishments."

Austin only forced another smile. An awkward silence fell. He continued to stare as if expecting me to betray some hidden truth.

Finally, I said, "But this job does take a lot of time. Can you leave any information that you have with my assistant, and she'll see if we can schedule something as soon as possible?"

"That would be great. One other question. Can you help us track down your . . . fellow classmates from the Marrion Home?"

"I should be able to do that. This evening I'll go through my personal files and see whom I have contact information for."

"Thanks very much."

We stood. I walked him to the door and opened it for him, and then shook his hand. Again the coarse grip like steel. He passed me a card. To make a good show of it, I pointed him at my as-

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sistant and told her to tentatively schedule something in the next week. I thanked Austin again and closed my door.

The Marrion Home. I had not been back to the orphanage in years, but had maintained close ties with almost all of my classmates. The eighty-seven others I grew up with were for me one large extended family. We had annual reunions, which most of us managed to attend even though we were now dispersed about the planet. We exchanged holiday cards by the dozens. Not a wedding or birth passed without everyone getting involved. And some of this family were very close indeed: I reached for the phone to make a call to Jack Reed, Vice President of Business Development for Ariel Systems, who worked just three floors below mine.

Jack had lived at the Marrion Home with me, a fellow orphan, one year younger. I hired him into Ariel shortly after I came there. Jack had already gotten a visit from Austin the morning before and had told me about it immediately afterward. This morning he had left me a voice mail explaining he urgently needed to talk, but I had not called him back yet.

Then I remembered it was Monday and set the phone down. Jack would be at OpenMed. I peeked out of my office, was relieved to see that Mr. Austin no longer lurked there, and told my assistant, "Something has come up and I have to go out. Clear my appointments for this afternoon. I'll be back for the board meeting at five."

I caught a taxi across town, which dropped me in front of a neat brownstone flanked by art galleries. Double glass doors marked only with "OpenMed" printed in small, neat green letters, opened onto a long room where a mix of students, grizzled doctor activists, and visiting scientists milled around tabletop computers, talking excitedly. I said a few hellos, learned that Jack was working upstairs, and ascended the minimalist winding metal stair tucked into the back of the room.

Jack slouched behind his desk, staring intently at a terminal. I watched him for a moment through the glass wall of the office. It was still morning, but his shirttail, somehow freshly soiled with jam, hung out. Always, after the first hour of work, his shirt was wrinkled and usually stained somewhere miraculous. His hair, which he meant to oil back, usually fell partly over his face. In any normal corporate environment he would have been overlooked and his genius would have been lost. His sloppiness would have been mistaken for indiscipline, his quirks of shyness confused with inability, his hesitation to make decisions would have overshadowed his ability to foresee their most distant consequences. But working under my protection he had done great things. His insights founded the strategy that had made Ariel the market leader.

Jack spent every other Monday here at OpenMed's main office, working with a dozen volunteers and activists. He did this by spreading over a year the four weeks of vacation he earned as a VP at Ariel Systems. I used to try to keep up with him, but with my promotion I could no longer spare the time, and could only help on weekends and some evenings.

OpenMed was a nongovernmental organization that promoted the development and distribution of new medical treatments that would be shared freely with any manufacturer, bringing the open source development model to drugs and biomedical technology. Jack and I had helped found it more than five years before, but it was Jack's baby. Now a global organization with a dozen offices around the world, OpenMed had some real successes, including the development of a new HIV regimen led jointly by graduate students at Columbia and some doctors in Cuba.

"What are you doing here?" he asked

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as I came in. "Don't you have the board meeting tonight?"

"I wanted to talk. I just got a visit from your Mr. Austin."

He nodded, frowning. "What did you think?"

I sat on the table. "I agree with you: he doesn't seem right somehow. And you called the E.P.A. and they said he didn't work there?"

"They couldn't locate him. But they also said the E.P.A. is big, there were recent political appointments, maybe he's just not in the directory yet."

I thought about that for a while. "Okay. Suppose he is E.P.A. What's his interest? Why does he seem so cagey?"

Jack furrowed his brow, as he did when thinking. "Maybe there is contamination at the home, but it's something very bad, something far worse than he says. . . . He might be helping some corporation that hopes to cover up an illegal toxic burial or spill."

I nodded. "It's possible."

"Right," Jack said. His voiced dropped low, although we were alone in the room. He leaned toward me. "But there's something else. Yesterday, after I called you, I called the home. I talked with the new director. She said that Austin had been there last week. And then something happened. I think something piggy-backed along my call to the home."

"Some kind of spyware?"

"No. A ghost came to my house last night," he whispered. "A ghost of William Marrion. It asked for you. And it said it's coming back tonight."

"A ghost? William Marrion would never have invested in such a vanity."

Jack shook his head. "I don't know. It didn't stay long, but it was very convincing. What should we do? I think you should be there."

I thought about this a long time. "You're right. We don't know. I guess we have to see what it wants. I'll be there. There's a dinner after the board meeting, but I can make it after that."

"Eleven, then? The back door?"

I nodded. Then Jack hesitated. "Allen?"

"Yes, Jack?"

"This doesn't seem right. This Austin and the ghost are probably unrelated. But maybe not."

I put a hand on his shoulder. "There's nothing we can do until tonight." I took off my jacket. "How can I help now?"

"What about the board meeting?"

"It's at five. I can spare a few hours."

He hesitated, then nodded emphatically. "We're trying to help a joint team of Venezuelan and Canadian grad students. I'll send you the files right now. I'm giving them a temporary copy of the standard Ariel bioinformatics package, but we need to work the phones to get someone to volunteer some genomics data."

"Will do."

After the board meeting and a dinner at Bice, I caught a taxi downtown to Jack's neighborhood. I wanted fresh air, so told the driver to drop me a few blocks away from Jack's apartment, and I walked through dark alleys where dumpsters sat askew, corners into the road, to get behind his building. I knocked on the back door. I had called ahead, and Jack was waiting. He pulled it open.

"Sorry, bulb's out," he said, as I stepped into the dark entranceway and pushed the door behind me till it closed and locked with a click. After a moment my eyes adjusted to the dim glow there, cast from the lights in the hall.

I felt a sudden, strong sense of *déjà vu,* overwhelmed by the memory of a moment like this years before—almost twenty years. It was late afternoon, but winter night. I ran through The Marrion Home's dark gymnasium, sneakers squeaking, following David Ressar, another orphan who had been a close friend. We sought Jack and a fourth friend, Janet. David had a strange passion for hide and seek, even as a teenag-

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er, turning serious and intense. He crouched as he ran, like a wolf on the hunt, and it took all of my effort just to keep up with him. We found Jack, finally, with Janet, hiding in the storage space behind the open bleachers. She and Jack sat across from each other, their heads together, looking at some secret trifle that Jack hid from the rest of us. Janet's long blond hair streamed down between them, forming a curtain. The solemnity of the scene stilled David and me, where we crouched in the small doorway to the storage room, and instead of shouting, "We found you!" David just whispered, "Hey."

"Hey," Janet answered softly, looking up with a smile. She radiated happiness whenever she saw one of us. She was this kind of person: accepting and appreciative of everyone. It destroyed her, in the end, when she left the home and entered the brutality of the world outside. But we knew no threats there, at that moment. We were just four fast friends, on the verge of becoming adults.

David and I stayed crouched in the doorway, and for a moment all of us were silent. Suddenly I understood, for the first time, that we all three loved her. Janet was the love of my life and of David's life and, in some way, of Jack's life, even though Jack was gay.

And now, to see Jack waiting solemnly in the dark, I felt the same overpowering sense of being bound to him, and to the others I knew from the home. We were united by a bond that all of the children of the home shared. It felt still as if we belonged more with each other than with the world outside and the lives we had made in it.

"Hey," I whispered.

He smiled sadly back, catching something of my mood. "Hey . . ."

We started up the stairs to his apartment. "How was the board meeting?" Jack asked.

"The usual. The chairman pulled me aside after and complained about our hours at OpenMed. I reassured him that open source medicine was making a market for future Ariel products."

"He accept that?"

"Not really. He told me the future is next quarter."

Jack lived in a converted loft. The entrance lay behind a massive wood and steel door on rollers. Leaning into it, he pulled the door open, we slipped inside, and I helped him slide it in place behind us. Once I had teased Jack about his student lifestyle—an executive needed to flaunt it a bit to be taken seriously—but he had only blinked and looked at the floor and mumbled that he didn't like unnecessary change.

The place had two bedrooms but it was otherwise a single great room with a towering ceiling held up by massive square wooden pillars, their edges rounded smooth with age and passing hands. Tall opaque windows let dim street light onto sparse furniture and heaps of old-fashioned paper books.

"The ghost came over the general com agent," Jack said, pointing at the corner of the room where an arrangement of a couch and chairs created a space around a single vid screen and its motion-capture cameras. We sat down together on the couch, and he turned on the screen. An entertainment menu automatically scrolled down, but nothing else.

"Do you want something? What do you think?" Jack was nervous.

I smiled reassuringly. "Nothing to do but wait," I said.

We didn't wait long. In a few minutes the menu shivered, and a pale glow started in one corner of the screen. A mitosis of pastel pixels divided and spiraled, grew exponentially to cover the screen, then shrank and resolved into the figure of an elderly man wearing a simple tweed jacket and charcoal pants, standing in a pale spectral wash of visual noise. This conservative, fatherly figure was William Marrion, the founder of the Marrion Home orphanage and doctor,

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geneticist, and philanthropist. I had not seen him or his image since the spring before his death, at the age of eighty-eight, two years ago.

"Jack," it said. Then it turned toward me. "Allen Sumaran?" It looked and sounded as if it might be a low-quality ghost: the face showed little emotion, the tone plodded a bit mechanically. Even so, it must have been very expensive and taken a lot of time and sacrifice to create. William would have had to move into a clinic, where rare specialists would have drilled dozens of holes down through his skull, and then every night for a month or two he would have slept with his head strapped to the mattress, wires shunted into his cortex as responses were tested during induced dreams and the personality simulacrum was trained. Ghosts were usually a vanity, not at all what I expected of William Marrion. We would need to learn if it had some other use besides appeasing the fears of a dying man.

"I am Allen. Why are you here?"

"I was set to activate if anyone called the Marrion Home and said certain things. I was triggered last week by a series of calls seeking the records of all the children of the Marrion Home, during the period of time when I was alive. I have deleted all but the most public of those records, but that will only delay the search."

"What search?"

"The search for you and your kind. I am about to tell you who you are, Allen and Jack. You must listen carefully and consider long before you tell others from the home.

"Before I founded the Marrion Home, I worked for the government, on a project called Enduring Security. Its purpose was to design enhanced human warriors. The last head of the daily operations for the project was this man."

The ghost waved a hand and a face popped up. The hair was different and the face was younger, but the green eyes, the left with a touch of brown, were familiar.

"We've seen him before," Jack said. "Tom Austin."

"This man's name is Sherman Wall. He is very dangerous. Working for decades, including nearly a decade under Wall's command, the Enduring Security scientists created several generations of individuals with very reduced fear reactions, accelerated growth and maturity, enhanced strength, and reduced pain sensations. However, the project was incomplete: when it became clear that these troops would resist suicidal orders, they brought me in to help.

"I was an expert on the evolutionary and genetic heritage of the orbitofrontal cortex and related subcortical brain structures. These brain areas control your ability to simulate the concerns of persons—both your own self in the future and other people. They provide the capability to value the future and to value the lives of others."

The ghost lowered its head. "I'm not proud of what I did. But I did it. We were at war against terrorists. I believed that something had to be done. So I helped design soldiers that had very short-term cares only. They were like frontal lobe damaged patients, analogs to sociopaths and psychopaths: able only to respond to immediate rewards. As a result, these soldiers could be trained to do anything, given that the costs to themselves were farther out in time than they cared to think about—a few days, or a few hours, even, if there were some reward that would come to them first.

"I succeeded. Austin got his breed of soldiers who would act without any concern for their own or anyone else's future. These troops fought one time that I know of, in the Syrian invasion. How many live today, if any, I cannot say. Eventually, a great struggle broke out in the intelligence community. Many opposed or feared the project, and ultimately they managed to shut it down and destroy or hide all records.

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"I moved on to industry and made my billion. But I wanted to do something better, to balance out the harm I came to realize I had done. So I founded the orphanage. And there I created you and your brothers and sisters."

For a while we just stared at the flickering ghost. Finally, Jack whispered, "What? You did what?"

"I had discovered that not only could I reduce the ability of someone to care about the future, but I could also enhance it. I could foster enhanced children who would care as much for the world of their grandchildren as they did about the next day, and who would care about other people as much as they cared about themselves. Can you see the genius of this? Everyone, every secret government program or even every parent, dreamed of modifications of humans into superintelligent individuals, or perfect warriors, or great athletes, or—most often—just blue-eyed blonds."

The ghost leaned toward us. "No one, not a single geneticist in the world, sought to enhance our species into morally superior individuals. This fact is a testament to the stupidity of humankind. No one sought to better us, to make our children the kind of people that would have prevented global warming or mass starvation or the death of the oceans. But I did it. And *you* are that people," the ghost said, managing a passionate emphasis. "You are something superior: a race of people that cares more, that *can* care more, about the future."

We sat, stunned, for a long time, before I asked, "Why should we believe this? We don't know where you came from, what you are."

"Allen, when you were ten, you and I sat alone in the swing behind the field. You asked me if I would be your father, and I told you I would be honored if I could be. Jack, when you graduated, after the party, I went looking for tea bags and interrupted you in the pantry, kissing Julian Rouse."

These were true things, that no one else should know. But the evidence was unnecessary. Deep down, I already believed. For the first time in my life, everything made sense.

At the orphanage, the outside world had seemed impossibly cruel. We all had made incredibly naïve and disastrous forays into our declining neighborhood on the outskirts of Philadelphia. I had tried to organize lottery ticket buyers to save their money and form a microcredit bank, and the grocery store owner that sold the tickets had beaten me up. Julie had started a garden for the homeless and they had left after a week with all the orphanage's tools. David stopped every fight he saw, and typically got drawn in. On and on. We simply could not understand why people did the things they did. At first, we believed that people hated orphans, but then we discovered that outsiders treated each other and themselves and the world just as they treated us. The ghost revealed the truth in what I had always liked to believe: we inside the orphanage were alone sane.

"It's true," I said.

"How could you do this? How?" Jack asked, leaving it unclear whether he was asking the moral question or the technical one. The ghost assumed the latter.

"I had done it before, you see. I already knew of people with unusually advanced frontal lobes. I had identified the relevant genes to be altered. And my government experience gave me the rest: I knew how to get surrogate mothers; I knew how to get the gene work done by private companies out of the country; I knew how to work away from the eyes of the Feds."

"Listen," I told it, "why are you telling us this?"

"I always meant to tell you, but then I died before I could. This ghost was a precaution."

"But why now? What do you—what did you want?"

"You may be in danger. I believe that

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remnants of Enduring Security may seek to locate and perhaps kidnap you. Or worse. There was always the danger that they would find out that I did something at the orphanage and believe that I had made soldiers. For sale, perhaps. I did not make soldiers. Except in one case."

"What?" Jack and I asked, both startled.

"David Ressar has both the first military enhancements and the frontal lobe enhancements. But I had only one soldier genome, so he is the only one. I thought perhaps . . . he could protect you. All the rest of you are normal but for the frontal lobe enhancements."

Even that made sense. David's awesome speed on the field, his ability to surpass all of us in every sport. His devastating defense of us when an outsider was cruel. His short temper.

"This is awful," I said.

The ghost lowered its head again. "I'm not proud of what I did. But I did it. We were at war against terrorists. I believed that something had to be done." It was getting repetitious. We were coming up against the limits of the ghost's programming and abilities.

"Tell us the rest of what you know."

"I have saved evidence of what the Enduring Security team did. It is stored at the orphanage, under the loose floor board where Jack hid toys as a boy, in the storage space behind the bleachers in the gym."

"You knew about that?" Jack said, with a sad, rueful smile.

"Yes, Jack. That information needs to be retrieved and used as a tool to bargain for safety. And it is time for you to know who you are and to claim the destiny of which you are capable."

"Why tell us alone?"

"It is time for you to know who you are, and to claim the destiny of which you are capable."

We had hit the end of the line with this ghost. "What now?" Jack asked. It was a question for me and himself, but the ghost answered.

"Now I will erase myself. One last thing: the enhancement, the caring gene, is dominant. And Jack, Allen, I loved you. I loved you as much as a normal human is able to love."

Then in a sputter of pixels it was gone.

Jack started crying. I put my hand on his shoulder. "What do you do," he whispered, "when everything makes sense after never having made sense?"

"I don't know, Jack." I waited until he stopped and wiped his eyes on his sleeve. "What do you think our options are?" I asked him.

He thought for a few seconds, furrowing his brow. "One option is to go public. They cannot harm us if we go public and tell who we are. A few of us are famous, so it will get attention. What do you think?"

I considered it. "You're right, as usual. Let's not do that yet, though. There may be other possibilities here. But we have to warn everyone else."

"I know where everyone is right now," he said. He wiped his eyes again and sat up stiffly, with new resolve. "I keep track of everyone. Except for Janet. You'll have to talk to David before you can find Janet."

"Can you get the files, at the home?" I asked. "It sounds dangerous, but one of us will have to go."

"I can do it. And I know all the out-of-the-way paths to the gym. I'll be safe."

"Then let me tell you what I'm thinking. If you agree, you'll need to plan the details. This is the kind of thing you're best at."

He heard me out, and then he said, "If something like that is going to work, you'll need David to agree."

"I know," I sighed, unable to hide my reluctance.

I took the fast train to D. C. There was no way to predict if this was going to tip off Sherman Wall to our suspicions. I had not visited David in years, but then,

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as far as Wall could know, I had months before planned to visit D. C. for business or even to meet with David as a scheduled day off. I packed a small bag, trying to make it look like a normal trip. There did not seem to be anyone following me at the train station, and certainly no one on the train itself.

From the D. C. train station, a short taxi ride dropped me in front of a white building with a green door on a broad boulevard of identical buildings. I looked up at the four stories of windows with oxidized copper frames, my bag in hand, hesitating. I had seen David each year at our annual Marrion reunions, and I exchanged e-mail with him at least every month, but I had not been alone with him, not come to visit just him—I'd not really talked with just him—in years. The pain of having lost Janet was a wall between us now. That and his anger at everything.

He had had minor success as a poet and personality, and then great success as an activist. Around the globe, people recognized David as the inventor of IAA, Individual Accountability Activism, a radical and very effective new technique in civil disobedience. Past activists had sought to pressure corporations in PR battles, which pitted a handful of young, usually naïve activists against vast armies of Armani-clad professionals at Burson-Marsteller and Shandwick and Hill and Knowlton. David bypassed this.

His technique was to find the decision makers in the corporation and take the battle to them. At the soccer game of the eight-year-old daughter of a shoe titan, they handed out photos of eight-year-old girls working in one of the company's dim, smoky Cambodian factories. At the grocery store where the neighbors of the chairman of a chemical company shopped, they set up stands doing chemical analysis of fruits and vegetables on sale, revealing their pesticide content. They took out billboards in white-collar criminals' hometowns denouncing past crimes, held protests on the sidewalk before a CFO's front lawn, covered a golf course with tenacious genemod flowers at a country club where an agricultural executive was member. They raged against the barrier separating the clean, cold decisions made in boardrooms from the consequences on factory floors, in forests, in distant villages.

It was tough toil. It made a lot of work for cops, and the cops understandably took it out on the activists, roughly rounding them up for jail—usually before the activists made their stand for more than a few minutes. But the technique spread around the world and changed activism: suddenly a decision maker might face people who had measured the costs of his choices.

David was also a de facto leader among those of us who grew up at The Marrion Home. My hope was to turn our new knowledge of our identity into a rallying call of the eighty-eight. For this to work, I would need David's support, or at least not his opposition.

I walked up to the front door, but before I could knock, a young man in impossibly loose and shapeless clothes, his head sprouting a mess of dreadlocks, opened it and stepped out. He stopped when he saw me, noting with a frown my suit and tie.

"Can I help you?"

"I'm here to see David Ressar. I'm an old friend of his, visiting. Allen Sumaran."

He smiled. "Oh. He's up top." He pointed up, practically at the sky, and then hurried off.

The four-story building was full of people, most of them young students. Some were talking in tight little circles, passing papers and pointing at charts. I walked by one room where a bank of phones rang. Through another doorway I saw people examining maps; they looked up at me with suspicion as I walked by. In many rooms I saw others who were simply reading terminals, digging through what looked like munici-

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pal records. I stopped a few kids on my ascent up the winding stairs and was always pointed farther up to find David.

Finally I came to the top story, the fourth floor. There was a small landing with three doors, all of them open. Through one I could see David standing before a dormer window, his back to me. The rigid posture, hands folded behind his back, the broad shoulders, the tight readiness of his stance: these were things I had long before grown used to, but I saw them now in a different light. He did look ominous, powerful, like a warrior held back with an effort of restraint.

We had argued the last time that just he and Jack and I had been together. David was taking Janet with him to Paris, then on to Africa. While Janet had searched her bedroom for some forgotten thing, we stood on the sidewalk outside the apartment David shared with her, waiting for the taxi to the airport.

"Don't do this now," I had implored. "Janet is not ready for this. I can take care of her here."

"She doesn't want to be taken care of," David growled. "She wants to live. She wants to go to Europe and then to Africa and be useful to the world."

"But you have no money, no plans, no contacts. Nothing. It's so incautious."

"You plan your life to death!" Then he turned to Jack. "Jack, you have to decide: will you come with us? We need to get out and see what is happening in the world. You could learn so much."

"What should I do?" Jack's face twisted with pain and uncertainty.

"You stay with me," I told him. Jack would have suffered terribly under David constantly forcing him to make decisions.

That made David angry. He hissed and turned his back to me, just as it was now. Then the taxi had come, Janet had run by planting brief kisses and crying, and they were gone. Gone for years.

I gathered my courage, walked into the room, and closed the door behind me.

"David?" I whispered.

He turned. "Allen? Allen? What?" He hurried to me and hugged me, lifting me off of the floor. "I was just thinking of you, I swear, when Jack called yesterday." He set me down and stepped back to get a look at me. "I couldn't believe the message from him, that you were coming. It's good to see you."

I smiled with relief and gratitude. "David, it's good to see you, too. I'm sorry I've not come here before, to make a visit with just the two of us. I'm ashamed that I've not come before."

"Life is hard," David said, waving a hand to dismiss my apology. "Just getting through it takes all of your time. Don't be sorry." Looking frankly at him now, I saw that his face had become deeply lined. He looked somehow like he had been unhappy. But he smiled generously at me.

"So what is it?" he asked, grabbing my shoulders in his hands. "What brings you here? Why the secretive messages from Jack? Can I get you a drink? How is Jack, really?"

I laughed at this barrage of questions. "I'd love some water." He walked to a small refrigerator, and I talked as he poured a glass for me. "Jack has been the same. A little sad, and a bit lonely. Still in love with Julian, I think. But he's a success. He'd like to quit Ariel and work full time at OpenMed, of course, but OpenMed is hemorrhaging cash, and it needs the extra money from his VP job. And from my job. Also, we make good use of the connections we have at Ariel. But, listen, we'll have to catch up later. Let me start with the pressing issues. These are not easy things, David. Do you have time now to talk?"

"Sure."

He handed me a glass and we sat. "This is . . . well, just hear me out in full."

I told him about Sherman Wall's visits and then about the ghost. I told him all it said about us, including what it had

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said about him. As I talked his teeth clenched down, and finally he jumped up and stamped angrily back over to the dormer, and stood, just as I had found him when I entered the room, staring out over the street traffic.

"Do you believe it?" he asked when I was done.

"Yes. It knew things only William could know. And . . . it makes sense. Doesn't it?"

"Yes," he said. "Yes. For all of us the world outside was hell. Like having a raw, open wound. The brutal stupidity of everything. It still is like that . . . and now we know why."

"That's right," I told him. "We simply care more. Or, we care farther."

"You care more," he said. "There's the fact that I'm simply a bred killer."

"That's not true. You have the same frontal lobe enhancements, the same innate greater measure of the future, that all the rest of us do. You are merely stronger, faster, more fearless. That's all. That's it. You've never killed anyone."

He turned and looked me hard in the eyes. He looked at me for a long time. I tried to meet his eyes, but eventually I had to look at the floor. Finally he said, "Do you know why I've dedicated my life to nonviolent activism? Do you?"

I didn't answer.

His voice turned dark and fierce. "Because I want to kill. Every lying executive, every filthy lobbyist, every sold politician. Every son of a bitch willing to sell out the world and everything in it just so he can have another million more. Most everybody, that means. I want to kill each one of them with my bare hands. I can hardly control the rage. I can hardly control it. I spend all my time controlling it."

A shiver went down my spine. I answered slowly, carefully. "I know you, David. I love you. I trust you. All of us trust you. You've changed the world for the better. That's something. That's something important. You can be . . . proud."

He frowned but said nothing.

We were silent a minute, but finally I said, "We have a lot to do. We have to deal with Wall and this group."

He exhaled sharply and nodded. "What does Jack think? He's always good at thinking these kinds of things through."

"Jack thought maybe we should go public. Say who we are."

"Jack is right."

"If we keep this a secret among the eighty-eight, we could . . . organize. Coordinate our efforts. Together, without the attention and suspicion that publicity would get us, we could really work to change things."

David shook his head emphatically. "I'm not interested in secrets and spooks. My whole life is based on not keeping secrets. On transparency. On bringing the hidden into the light."

I sighed. "I want to finally have some effect. Some real effect. Maybe all together, knowing who we are, working without interference. . . ."

"No."

I searched my mind for alternatives. "How about this: we get everyone together, and we put it to a vote. You make your case, and I make mine, and we put it to a vote."

"You know how hard it is to get together for our annual reunion. How will we organize one in the middle of the year?"

"I have a lot of money. And my farm in upstate New York could fit everyone."

He laughed bitterly. "You always were so practical. I thought it was a kind of coldness. But . . ."

"It was a kind of fear," I confessed, surprising myself.

"Let's say cautiousness. Maybe even foresight. But I refuse to accept secrecy. Look," his change of tone made it clear he was changing the topic, "I agree we have to do something about this group with the ridiculous name. I'll come back to New York with you. We'll meet this

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Wall together. I've dealt with his kind before. There's strength in numbers, and in my experience."

"Okay." We sat in silence a moment, while I gathered the courage to ask the question. "And . . . how . . . ?"

"How is Janet?" he finished for me. He made it sound like an accusation.

"Have you—" My voice faltered. "—found her?"

His expression softened. "Yes. Yes. There's not much left of her. Not much at all."

"Where is she?" I asked, terrified of what I was going to find. In answer, David just pointed, straight out the window, at the building across the street.

"You'll have to go alone," he whispered. "I watch over her, but I can't bear to, to . . . be in the same room with her."

I stood before a simple blue door in a clean, empty hallway. After a long time there, gathering my courage, I knocked on the door twice. I waited a minute until I heard a deadbolt turn, and then the door opened slowly.

And there she stood. She was older, of course, and her hair was somehow darker and had been cut short. A long and ugly scar twisted across her left cheek, from the corner of her mouth to her ear. She smiled at me hesitantly.

"Yes?" she asked.

There was no recognition in her expression. She waited for me to say something.

"My name is Allen Sumaran. . . . We were friends, long ago. When we were children."

"Really?" she said, smiling widely now. The scar folded deeply into her cheek. "Really?"

"Yes, really."

"Cool. Come in."

I stepped inside. It was a small, one-room apartment, with a single dormer opening over the street. I looked out across the boulevard to see if David was there, but his window was empty.

"You don't remember me?" I asked.

"No. But I don't remember much, you know?"

I did know. David told me the story. Janet had always felt the pain of the world more acutely than the rest of us, but she still dove deeper into that pain. As a human rights worker in Angola, she got caught there during the genocide. She saw thousands macheted to death before U.N. helicopters pulled her out of the French embassy. That was followed by some kind of breakdown, and afterward she clung to David, the ultimate protector. But David was not always there, and finally she had wandered D.C. and ended up a heroin addict. David put her into rehab, and thus started a cycle of getting in and out of the addiction. Eventually she stopped with the heroin and started taking rewrite, which was raging through D. C. at that time.

The drug, designed to help repair brain damage, was a neural growth factor. Street abusers mainlined it and got high off the childish awe that resulted from having your memories and beliefs and hopes loosened up, washed away a little, overwhelmed with possibilities arising both from weakened neural connections and an explosion of tentative new ones. Those who shot rewrite frequently for a few months ended up as simple as children, their past erased. They had to start over. It's not hard to imagine why people in pain did it.

When David had finally relocated Janet like this, almost six months before, he had moved her across the street, where he could remain vigilant from a distance.

"Listen," I told her. "I don't know how else to tell you this except directly. I grew up with you, and I'm friends with other people who grew up with you. We all love you. You may be in danger now. There are people who may want to hurt you. I want you to come away, to my farm in New York, to meet some other people. Maybe next week. You can do anything you want there. I'm rich. You won't need anything. You can stay

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there as long as you like." I put my hand on her arm. Tears welled in my eyes. Janet was gone, but this was Janet as a child again. How could I not protect her? "Do you understand?"

She shook her head.

"Will you come with me anyway?" I asked.

"Sure," she whispered. She smiled a little. There was a sad look in her eyes, and suddenly she was intimately familiar to me. There was still something of Janet here, in this smile, and in the deep pools of kindness behind it. "I just have a feeling that you're okay," she said. "But what about my friend David? He takes care of me here. I don't see him much, but he takes care of me. He might worry."

"David is my friend, too. We grew up with David, you and I. David took care of me, also, once upon a time. He's going to come with me to New York for a few days. Then we'll come back and take you to my farm. He'll visit sometimes."

"That will be good," she said.

I started crying then, standing in her living room. She was even more pathetic like this, innocent and trusting, than she had been as an activist who knew and felt all the secret pains of the world.

"Don't cry," she said.

"Why did I wait so long?" I asked aloud. "Why did I wait so long?"

"Don't cry." She put her hand on my arm. It only made me weep harder.

The next morning, as I sat with David at the train station, my phone rang. It was Jack. He read a phone number to me, a number for a disposable. I wrote it down, hung up, and then bought a disposable phone out of a vending machine. I called the number, leaning against a wall, away from the waiting crowd, apprehensive about Jack's precautions. David watched me, frowning but saying nothing.

"Did you find her?" Jack asked. His voice was distant and tinny through the solid-state speaker.

"I did. David thinks it might be good to get her away from D. C. She's agreed to come to my farm."

"How is she?"

I didn't answer. The silence hung there for a moment.

"Did you get the files?" I asked. I meant the evidence about Enduring Security.

"Yes. I've read and watched some of the recordings. It's horrible, Allen. Horrible. They were just little kids, mostly. Living in little white rooms, like lab rats. The lab coats just watched them, droning on in their monotone observations and measurements. Never touching the children except with gloved hands. And they pitted these kids against each other sometimes. In one fight a girl killed a smaller boy before they could stop the fight. On tape. How she cried and cried." He choked once. "Dear God, they called them 'Freedom Fighters.' They were children and they made them live without love and they called them 'Freedom Fighters.'"

I tried not to think of it. Not yet. "You've made the preparations?"

"R-right . . . All of them."

A conductor called all aboard for the train. "We'll see you in three hours," I said. I broke the phone in half and threw it into a dented and overflowing trashcan nearby. The abused can struggled to say, "Ank-k-k-k-k-k you!"

When we pulled into Penn station, I called the number on the fake E.P.A. card for Tom Austin. I got a switchboard, and after a long wait I was given over to Sherman Wall.

"Yes, Mr. Sumaran?"

"Tom, I wonder if you could be so kind as to stop by my office this afternoon. Maybe around two. There's something I want to discuss with you."

"I'd enjoy visiting you again, but I wonder, could you come see me? We could combine a meeting with a visit to the doctor."

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"No, sorry. I have meetings nearly all day, and although I can move them around I still have to be in the building. But, you see, I found some old files that William Marrion had left to me. It's stuff I never bothered to look into, but I picked it all up the other day after you visited me. I wonder now if there is anything there that might help your investigation. Most of the data has 'Enduring Security' written on it. I suppose that means that these are encrypted files or something. I have them all in the office with me today."

"Why don't I come see you around two?"

"Great. Thanks."

"No. Thank you."

I hung up.

Wall was early. I let him in and closed the door.

"You've already met Jack," I said, gesturing to where Jack stood by my desk. "And this is David Ressar."

Wall flinched. His left eyebrow twitched compulsively. He knew that Jack and David being there meant something was up. "Yes. How are you, Mr. Reed? It's a pleasure to meet you, Mr. Ressar."

"I'm better than I was," Jack mumbled.

Wall frowned at this but said nothing. I gestured for him to sit, and sat myself behind my desk. David sat, but Jack did not.

"Are those the files?" he asked, pointing at the pile of silver disks on my desk.

"This is a copy of the files," I said.

"A copy?" He looked at David, then back at me.

"A copy. And with a touch of the button," I said, reaching over a keyboard built into my desktop, my finger hovering over the enter key, "I can email complete copies of the Enduring Security project records to respected journalists at the New York *Times*, the Wall Street *Journal*, *the Independent* in London, and seven other leading newspapers in Europe. I wrote a personal e-mail explaining that in our work on bioinformatics software for military contractors we had accidentally discovered scandalous files. With my reputation on the line, they'll trust the story and run it. And they'll dig deeper."

Wall said nothing. His left eyebrow twitched. "What is this?" he asked.

"We want to be left alone. All of us."

He shook his head. "That is not an option. I know what you are."

"No, you don't. You think we're military enhanced individuals. We are not. We were modified, yes. But listen: we were modified to care more. That's it. We were modified to be able to care about the deep future as much as you care about the next ten minutes. That's all. Nothing more."

Wall stood up. He reached into his pocket and drew out a plastic gun, the kind you can get past security. David and I stood, but Wall pointed the gun at David's chest.

"Is that what Marrion told you?" he spat. "I believe you don't know what you are—that's why I came directly to you. But I know my work." Then he punctuated every word with an angry jab of the gun toward David: *"I . . . know . . . my . . . work."*

"No. He's . . ." I hesitated.

Wall looked at me, still holding the gun on David. "You two are something different, maybe. It's better hidden in you. But this one is a final-run killer. The best. He's *mine*. I—*I*—made him."

"No," David whispered. His face turned red with despair and rage. "No."

"Yes," Wall said to him emphatically. Then he looked back at me. "I saw that article in the *Journal*, and there you were, two orphans of Marrion's, in positions of power. So I did some investigating, and what did I find? Activists, writers, industry leaders, professors, inventors. Anita Trend. Anna Joy. Maya Marr. Phoebe Gillett. You three. Every Marrion orphan in a position of power, of influence. Sleepers. Warrior sleep-

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ers."

"What do you want?" Jack asked.

"You're coming in. Enduring Security was closed down by small-minded bureaucrats who're long gone. We're going to start again. All of you come in to my agency, and you tell me everything you know. And we get samples—tissue samples. Then maybe we can cut some kind of deal. That depends on what you are doing, what you know. Maybe we'll let you relocate and live separate lives. But that's the deal: you come in for questioning and samples, or I'll kill you myself." He let that hang. "I won't allow freelance gene-jobs, stolen government weapons, to take positions of power for purposes we cannot know. You're a clear and present danger to our nation. I don't want to, but I'll kill you myself. I've done it before."

"We are no threat to you," I said. I started to walk around the desk.

"Stay right there!" Wall shouted, turning the gun on me.

It was over in seconds. David moved in a blur and pounced on Wall. Wall knew how to fight, and their arms snaked around each other, furiously twisting, as each sought advantage. Then the gun cracked, twice. And a third time. Jack shouted, an inarticulate cry.

Wall fell to the floor, smoke rising from his chest. The gun hit the floor with a thud. David kicked it into the corner. We stood a long time, frozen, not breathing, listening to Wall's lungs gurgle and struggle.

"Call an ambulance!" Jack finally said.

"No!" David turned to us. Tears brimmed in his eyes, and his face was red with fury. "No. Wait. Let him die. There's a chance no one else will follow him."

Jack opened his mouth, leaning forward, but then seemed unable to speak.

David spoke through his teeth. "This is the deal. You send those files. The world learns what's there. But you get to keep your secret. Our secret." He said it with anger, as if I had won a bitter victory over him. "You keep it. I don't want people, people to . . ." He didn't finish the sentence, but turned and left the room.

I pushed the button on my desktop, e-mailing the files to the journalists. Jack grabbed the phone and called an ambulance. Then I crossed the room and crouched down close to Wall. Wall seemed unable to move, but his left eye twitched as he looked up at me. The last of his life was bleeding away.

"I'm sorry, Mr. Wall," I whispered to him. "You've given me back my dreams, and I'm sorry we have repaid you like this."

Looking down at him, I realized that he had been right: we were a threat. Why could a vast conspiracy never work? Because never did all the people involved care enough to keep the secrets. Why was it so hard to make the world a better place? Because so few care enough to do what needs to be done, the long, slow, hard work, decade after decade, even century after century. Every evil, every weakness of the human race can be traced back to the inability to just care enough. But we care. And that is an awesome power. Our kind will run the planet in another hundred years. No one will know, but we will run it, and we will run it for the better. Wall's spook factory will be a forgotten illegal bureaucracy, military might will come and go, nations will rise and fall, but our people and our plans will endure and come to fruition.

I said it aloud, the last words Wall would hear: *"Amor vincit omnia."*

Wall stopped breathing. I closed his eyes.

It was going to be easy to create the headlines: rogue spy attempts to kill executives who accidentally exposed his secret project. A clear case of self-defense. The scrutiny would end in a few months.

And then we will get to work. ■

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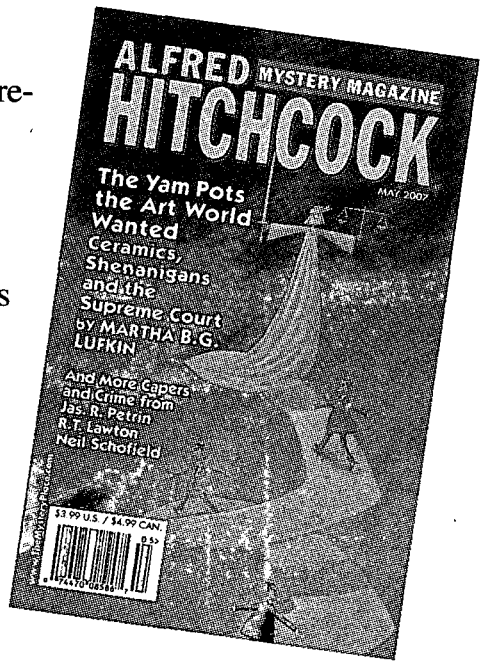

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Righteous Bite

Stephen L. Burns

Even if a job must be done, it isn't necessarily good for those who must do it....

Enemy territory.

Benny and Spike never let themselves forget where they were, never let their guards down for even a single moment. One misstep would be all it took to screw the pooch. They would end up dead or captured. Dead was better than captured. Far better.

That was the risk you took as a member of a Special Tactical Incursion Corps. Deployment meant a high-wire act deep inside enemy lines.

The alley where they had concealed themselves looked like a bomb had gone off in it. Because one had. The part of the city they were in had seen every sort of bomb and bombing: aerial bombardment with bunker busters and ten-pound intelligent Shithead Hammers, mortars, RPGs, IEDs, car bombs, even Molotovs. The air was acrid and heavy with the reek of burnt wood and organics, scorched metal and stone, the ground strewn with rubble and debris.

Their mission had been laid out in a series of geographic points that they were to reach within a certain window of time. Harrier Drones and Suicide Shrikes randomly buzzed zones on the edges of that route to provide a level of diversion. The alley they were in was point number three. Four more would take them to their objective.

The area was clear enough for a quick break and a whispered consultation.

"Still on sked," Benny whispered.

"Yeah." That was Spike's way, saying as little as he could. Benny was getting used to it. Spike was a veteran of several of these forays, maybe that was why.

"Getting dark." Benny looked up at the patch of smudgy sky above. Night was falling. The moon would not rise until near dawn, long after their mission objective was completed. A pall of smoke hung over the city like a shroud. Soon the darkness would be deep and starless. How many hours had he trained in the dark? More than he could count. Would the training be enough? Would he be good enough?

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"We own the dark," he said to reassure himself, a slogan from that training. "Right, buddy?"

Spike stared at him a long moment, gave the ghost of a nod. "Sure."

Less than three blocks from the alley their mission almost came apart when a bearded man with a Kalashnikov suddenly popped up in a bombed-out doorway and lurched in their direction. They froze, settling noiselessly into the shadows, barely breathing.

The man was obviously drunk. He staggered closer, muttering under his breath as he fumbled with the front of his trousers.

"He get you?" Spike whispered once the man stumbled away.

"Yeah." This time it was Benny's turn for a laconic reply.

"Good soldiering."

Praise from a veteran like Spike did much to wash away the indignity he'd just endured. "Sure," he said. "See the world. Protect freedom. Play urinal."

That even made Spike cough up a short, soft chuckle.

The closer they got to their objective, the hairier things got. There were armed men everywhere. On foot, in cars, in pairs, and in groups. That made the mission harder, but was to be expected inside an insurgent stronghold.

Progress was slowly gained by feet, by inches. It took all of their skill and training to evade detection, and after two harrowing hours Spike, the senior of the two, called for a break by signaling that they should crawl into a bombed-out cellar.

Once they were deep inside and well concealed they could let their guard down for a minute. Somewhere nearby a radio blared jihad anthems, strident voices haranguing death to just about everyone over the thump of drums. The music sounded good to Benny because it would provide cover and give them a chance to talk.

"I make us still on track," he whispered after a slug of water to wash down a chunk of HEFR ration bar. The military-issue energy bar smelled like dog food and tasted like sugared dirt, but going hungry during a covert op like this was dangerous. A growling stomach could be a fatal giveaway, just like a cough or laugh or the clink of dog tags.

"Yeah." Spike bit off a chunk of his own HEFR.

"I figure another hour to our objective."

"Sounds right."

"We get it done, then get on back."

"ACAP," Spike agreed. As Carefully As Possible.

Benny was silent a moment, then asked, "What're you going to do when you get back to base?"

Spike shrugged and took another bite of HEFR.

"Me, I want a steak. A steak and fries. Cold milk."

"Hate milk," Spike muttered.

"Not me. I want a hot meal and a hot bath to get the stink of this place off me."

"I hear that."

"I should shut up. Nerves, I guess. This is my first real mission."

"I know, kid."

"I want to do it right. Make my unit proud, make my country proud. Help fight the war on terror."

Spike climbed to his feet. "We better get on the hump."

Benny nodded and stood. "I'm ready."

"I know you are," Spike said, for some reason sounding sad.

They safely made it into the deepest part of the insurgent stronghold. Midnight had come and gone. There were fewer patrols on the ruined streets, but the ones that were out seemed more inclined to shoot at the slightest provocation. One patrol had poured a deadly hail of bullets into a nest of rats just a few dozen yards behind them. They stuck to the shadows, stuck to the rubble.

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Benny was glad for all the training he'd endured. At times he'd thought it would break him, other times he'd been convinced it would kill him. But now it was helping keep him alive.

One part of that training paid off when they had finally drawn within a few blocks of their objective. Spike had point, but was looking in the wrong direction to see what Benny did: a faint gleam of light on a curved surface, a piece of a shape that sent up red flags in his head.

He grabbed Spike from behind, stopping him. Spike froze in place, then turned back with a question in his eyes.

Benny indicated the potential danger with a movement of his head.

Spike looked where Benny directed. What he saw had him backing up until the two of them were side by side.

Bomb, Spike signaled silently. Benny nodded.

We go around.

Benny nodded again.

They began working their way backward, crawling on their bellies. Once they were clear, and before starting out on a path that would skirt the ordnance, Spike moved up close and whispered into Benny's ear so softly that no one else could hear. "Good spotting, kid. I never saw it."

"Thanks," Benny whispered back. "I was lucky."

Spike stared at him a long moment, then looked away. He sighed, then with a jerk of his head signaled that they should get back in motion.

Together they moved deeper into the dark and broken buildings.

Less than a hundred yards to their objective.

This was, the mission planners had judged, the best time for such a strike. Now a bit past 0300, most of the locals were in their beds. Small bands of armed men still roamed the streets, but they made so much noise they weren't that hard to avoid.

Benny's excitement cranked higher as the distance to their goal grew shorter. The man they were after was on several international most-wanted lists; Omar Parque, the man known to many as the Packager because he specialized in small, easily concealable, and extremely deadly bombs.

Parque wasn't even from this part of the world. Although of Algerian descent, he'd been born and raised in Detroit. That made him a traitor. Worse than a traitor, he was what had come to be called a Boomer. Men who bombed not because they believed in some cause, no matter how twisted, but because they had become addicted to bombing, to death, to the fear they spread, hitting their blood like a shot of Hype. Parque, like his fellow Boomers, would go wherever and work for whomever gave him the most chance to kill as many people as possible in the ugliest manner he could devise. For money and pleasure.

The intel that had put Parque in this city and in the house he and Spike were headed for had been dearly purchased.

Benny intended to see that the price paid was not wasted.

They finally reached the house where Parque was supposed to be staying that night.

The building was in better shape than many of the others nearby. The windows were mostly intact, and though its façade was stitched with bullet holes, it seemed to have somehow escaped any major strikes.

The upper floor was dark. Only a couple small lights showed downstairs.

Benny and Spike ghosted along the side of the house, keeping to the shadows. Odds were that there were guards at both the front and back doors; the insurgency would be making sure its deadly asset was kept safe. The back door offered more privacy since it opened onto a walled yard, and that entry point had one other tactical advantage.

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Not far from the house a small generator chugged away, providing power for the house through a heavy extension cord. They had been told to expect this. Another piece of intel proved true.

They exchanged a glance. Spike motioned that Benny should take the generator.

They split up, Spike merging with the shadows near the doorway. Benny went to the generator. He studied the machine a moment, considering his options, then pushed the button that tripped the safety breaker.

The lights in the house snuffed out. Inside, someone cursed. There was a muffled exchange as what to do was decided. Two voices.

Spike caught the man who came out to see what was wrong with his MITTA, a military issue Taser that poured so much juice into the guard that he died instantly, unable to make any sound other than that of dead meat hitting the ground.

As Spike ejected the spent wire cartridges and reloaded, Benny gave it a ten count, then restored power to make anyone in the house think everything was okay. That task accomplished, he hustled across the yard to join Spike.

Together they slipped inside to find and neutralize any other guards.

Up the stairs they went, silent as death. Ready to deal death.

Benny was scared. Excited. Eager and full of dread.

This was one of the baddest of the bad guys, he told himself. His death would mean countless innocent people might escape death and disfigurement. That was a good thing.

His superiors told him this was right.

His instincts told him this had to be done.

This was a righteous bite, taking a chunk out of the enemy's ability to spread fear and death. He'd heard that a hundred times, said it a hundred times. He believed it.

As he reached the top step, that thought helped push any lingering doubt behind him.

The bedroom door was booby-trapped, but they had expected that. Spike took care of it quickly.

Now only one door left standing in the way between Parque and the well-deserved death that had come for him.

They slipped into the darkened bedroom, Benny first and Spike right behind him. They paused just inside the door. Benny looked to Spike. He nodded, then said the three words Benny had been told to expect, the three words that were his signal to go do the work he had come here for.

The words came out softly in the quiet room, barely a whisper.

"Sic him, Benny."

Benny felt a momentary rush like he'd been kicked in the head because of the sudden burst of emotions and images and buried commands that swept through him in an incendiary wave.

He bunched his muscles and leapt up onto the bed.

The bed shuddered under his weight. The hump under the covers turned into a man sitting up, staring in confusion.

To Parque sitting up, eyes widening as he saw Benny crouched over him. He started to raise his hand—

Benny went for Parque's throat, teeth clamping down hard. Blood spurted around his teeth, flooding his mouth with heat.

Parque's hands beat at his head, at his muzzle. Benny's claws scrabbled at the bomber's chest, tearing the sheet, shredding skin.

Back at the door Spike watched, waited. Following orders.

Benny wrenched and tore at Parque's throat, growling now deep in his own throat, able to feel the buzzing scream trying to get past the knot of tissue his teeth were clamped around. *Parque had to die. Parque had to die.* The im-

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perative tolled in his head.

Benny bore down, grinding his teeth deeper. He did not see the bomber reach out and paw at the table beside the bed, did not see Parque's grasping fingers close around the pistol there. He ripped and tore at the man's throat, unaware of the gun coming up.

Spike bared his teeth and started forward, but went no more than a step closer, chained by his own orders.

Parque got the gun pointed at Benny's head, the finger he had curled around the trigger tightening.

Spike faded back out the door.

As he reached the top of the stairs there was a muffled report, soon followed by a strangled, bubbling cry.

He raced down the stairs, through the house, and out the back door. A single leap carried him over the wall into the yard of the house next door, and his four feet carried him away faster than the furious clamor the gunshot brought to the house he had just left.

Spike knew that even if Benny hadn't managed.to tear Parque's throat out before he died, the bomber was a dead man. Even if he got medical attention fast enough to stop the bleeding and repair the damage, the genetically engineered rabies variant Benny carried would deal the man a fast, ugly, and painful death.

Parque had been killed by a dog, just as had others of his ilk. That was guaranteed to further raise hackles in this part of the world where his kind were despised. The how of it would have them guessing—and sweating—for some time to come.

They would probably never know that this devil dog could talk. Could read.

Or that he was friendly, brave, and heartbreakingly naïve, less of an animal than Parque or his masters.

Retracing his path brought Spike to the place where Benny had saved his bacon, keeping him from finding that unexploded shell the hard way.

Benny had been a good dog.

He was a good dog. He followed orders and obeyed his masters, even when those orders meant that this was the fifth time he'd escorted some poor unsuspecting SOB to his or her death.

The Devil Dogs. Word was out there, whispers of dread. Just as his masters wanted.

Spike slowed, thinking hard about taking a small detour. About going and finding that unexploded bomb and setting it off so he wouldn't ever have to do this again.

But he went past without slowing.

He would faithfully return to his masters.

Good dog, they would tell him. Good soldier. Hero in the war against terror.

Good dog.

Spike was learning to hate the sound of those two words. ■

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Good Morning, Class . . . .

by Robert Lundy

I spent an hour looking for
    The glasses perched upon my head.
Because I could not see my feet
    I stubbed my toe against the bed.

My lower back is killing me;
    The chiropractor soon will dine
In luxury from what I pay
    To have him reconstruct my spine.

My shoulder has been hurting
    since I tried to lift that heavy box.
My knee is an impediment
    To motion: now and then it locks.

My carpal-tunnel syndrome
    Makes it difficult to write each line.
The School Board mandates we believe
    "Intelligent Design."

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THE HOSPITAL OF THE FUTURE

"What will the future look like?" Good question. If you're a writer setting a story in the future, you need to picture the stuff of the future. What are the cars like? What are the houses like? What are the weapons like? What does a political map of the Earth look like? You get the idea.

Once you start writing about the future, and imagining what people are doing in that future, if you're like me you begin to worry about the details, particularly if you're writing anything set in the relatively near term. I'm pretty sure that if I check some of my own stories written in the '90s, I'll be embarrassed at how badly I missed the ubiquity of the cell phone and universality of the Internet. What is even worse is to write a story set in the future, therein to discuss, say, some sort of fantastic new invention, only to discover after publication that said invention exists now and you'd just never heard of it.

Suppose you want to write a story about a new kind of plague that strikes a city or country in the near future. When you describe the nature of the disease, you'd better be sure that its cause and symptoms aren't too closely mirrored by a disease that's already known. If your story revolves around some fictional form of treatment for that disease, you need to be certain that treatment doesn't already exist. If you're going to have your characters wind up as patients in a hospital, you'll need to provide some details about what a future hospital will look like, inside and out.

Let's do the exercise of imagining the hospital of the future. We're sticking to the near-term, so it's no fair to posit that surgeries are done by robots or that everyone has access to an "autodoc" or that injuries and illnesses are cured by filtering out the bad stuff in the beam of a matter transmitter. Nor are we going to invoke nanotechnology as a way to cure everything, even though current progress in nanotech *is* affecting medicine today, just as is affecting everything else.

For this exercise I will make you, the reader, a character in a story. You are going to visit a friend stricken with a mystery ailment, currently undergoing testing in the hospital of the future.

You are driving down the highway. It is near a major Midwestern city, though most of the countryside is fairly rural. You see barns and cows and cornfields. But off to your right is a beautiful squat pyramid of a building, reminiscent of an old *Analog* cover (January 1974, cover art by Kelly Freas for William E. Cochrane's "The Horus Errand").

Soon you spot the sign by the exit ramp to the hospital. It is not a small sign with the word "hospital" on it and a single arrow pointing either left or right. Rather, it is a large sign, on a tall pole, in lights, flashing messages—you can't miss it, which is the point. The hospital is in a suburban setting; the largest building in what is best described as a "health village." As you drive down the road to the parking lot, you notice a coffee shop, a pharmacy, a health food store,

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and a gym.

You park your car in the parking lot and get out. At first you think this parking lot was never quite finished. It is divided into several sections by shallow ditches choked with weeds. But then you look more closely and see that there is a bit too much uniformity about those ditches. They are a design feature of the parking lot. The ditches are actually bioretentive swales, also called rain gardens. They are there to help filter out contaminants from the rainwater that runs off the lot. The so-called weeds are just plants native to the area that can live without need for care.

You turn your attention to the hospital itself. It doesn't look a bit like the intimidating institution you oftentimes still see in movies. It looks much more like a fancy corporate headquarters, designed with the intent of setting current and future customers at ease. You note the landscaping; fountains, flowers, shrubs, and swathes of grass crossed by broad sidewalks. You see ponds, and stone garden walls, and you wish you had enough time to do the scene justice while capturing it on camera. The building itself boasts broad expanses of glass across the convex front of the main tower. You wonder what prompted the design, and look forward to walking the halls and exploring the floor plan. You notice classy flourishes of lenticular décor near the entrances, echoing the shape of the tower.

Upon entering the building, nothing says "hospital." It doesn't smell like a hospital. It doesn't look like a hospital. The lobby is wide and deep, with a cascading water display at the far end. Again, the lens-like décor is repeated throughout in the designs of the hanging ceiling panels and entryway desks. Over on the right is a coffee bar with a gift shop beyond that. To the left and to the right, through huge panes of glass, you see atriums filled with pools and grass and paths, with low walls to sit on. These are healing gardens for quiet relaxation and meditation. Of necessity, hospitals are places of plastic and glass and stainless steel and antiseptics. But what your senses tell you is that this hospital is much more than that. This is a place of earth and wind and water and sunshine, the blue and the green and the terra cotta of life.

You continue through the lobby and enter a curved hallway. To your left the wall is all window looking out on the healing garden. You can't see around the curve in front of you, but you feel as if just a few steps will bring you to where you want to go. You know in your head that this is a big hospital, but the feeling you get is one of coziness. There are no seemingly infinite cold corridors in this place. Everything is in earth tones, and though it doesn't show, the paint, carpets, glues, and fabrics were all chosen to maintain the cleanest possible interior air quality.

As you draw near the elevators you see the hospital cafeteria. It too is open and airy, with enormous windows looking out on the healing garden from the other end. The tables are populated with people eating and talking and laughing. Some are obviously members of the hospital staff for they share the same color uniforms, some in navy blue, some in beige, some in plum. Others could be either visitors or other staff members, until you notice that all staff members are wearing name badges. You watch as a pair of pretty young women in blue walk to a door. One waves her badge at a sensor and the door unlocks and they go through.

You ride the elevator up to the sixth floor. As you walk down the crescent hallway, you almost feel like you're on the Starship *Enterprise*. Ahead of you a doctor steps out of a room—no, the doors didn't slide apart. But he speaks into a pendant. "Where is Dr. Petkus?" he asks. "Dr. Petkus is in the Pathology laboratory." "Call Dr. Petkus." A moment later: "Hello, Tom. What can I do for you?" asks Dr. Petkus. In the hospital

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of the future, doctors and nurses and other caregivers will be able to communicate with each other instantly and reliably from anywhere in the building.

You pass several rooms on the way to visiting your friend. You notice that all of them are identical in layout and much larger than is traditional. You enter her room. Talking to your friend isn't a part of this exercise, so we'll assume she's sleeping. There is a sofa in the room. You could fall asleep on it yourself since it converts into a bed. Your friend fell asleep with the TV on. It is flat panel LCD HDTV, not the biggest in the world, but a pretty good midsize. There is one in every room, with high speed Internet access thrown in. The program showing is from the hospital's own video archives. It's an informational piece about the surgical procedure rooms. It shows you an octopus-like piece of equipment attached to the ceiling, with many arms each holding different pieces of equipment. You are told that each surgical light has a built in camera so the doctors can record and photograph a surgery as it happens. And while a surgery is going on, there is an air curtain surrounding the surgeons, nurses, and patient to keep airborne contamination away.

You wander over to the large windows and look out. Down below you spot the healing gardens, but what is this other garden you see? You didn't notice that on the way in, but there it is, and it's easily an acre in size. Then you look closer and realize that the reason you didn't see the garden before is because it is on the roof. Even more than that, it *is* the roof, a green roof. Later, after your friend wakes up, you'll watch a program together on the TV. It will discuss this roof. You'll learn that the roof has over 100,000 plants growing in four inches of soil. The sedum and allium plants will minimize storm water runoff and help cool the surrounding air. They will also bloom all year around in assorted shades of amber, pink, purple, and burgundy. Even the surrounding green spaces about the health village are irrigated from retained rainwater instead of from the city water supply.

You will learn that at this hospital of the future, the health of the environment is as integral to her mission as is the health of the patients. Cleaning solvents are non-toxic. The dinnerware in the cafeteria is biodegradable, made from corn and sugarcane. Computers and light bulbs, paper and cardboard, batteries and x-ray film, all are recycled.

But for now, you turn from the window and decide to let your friend sleep a bit longer. You remember that coffee bar in the lobby. You step back into the hallway, but hesitate. You were going to go to the elevator, but why not take the stairs? You know this hospital will have windows in the stairwells. And there is so much more you want to see.

So ends the exercise.

My regular readers may wonder why I've made my hospital of the future such a "green" place since you know I'm a global warming skeptic and not prone to accepting hysterical environmentalist propaganda. But clean air is to be preferred over dirty air regardless of whether or not you think it is a major problem. And many of the things the global warming crowd would like to see done are worth doing whether or not you think catastrophic climate change is on the way. And regardless of what I think, the current trends are all toward greater use of green technology and design, so we will find buildings of the near term designed with that in mind.

Though the exercise is over, there is one additional detail about the hospital I should add. It is not actually the hospital of the future, but the hospital of the present. I know because I work there. Nothing of my account was fictional (not even the pyramid on the drive there).

Remember that when you set your own story in the hospital of the future. ■

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How I Saved the National Science Foundation

Robert Scherrer

I slouched in the captain's chair of my yacht, the *Fallow Earth,* watching seagulls on the Captiva dock spear french fries from abandoned plates outside Cap'n Al's Restaurant. I closed my eyes and leaned back to feel the warm Florida sunshine, then swiveled my chair to face the man from the FBI. "So it's a crime these days to make money?" I asked.

"Not at all, Dr. McCarthy." The FBI agent smiled. "But when a government employee strikes it rich . . . well, questions get asked."

"Look," I said, "I wasn't a government employee—not really. I was what they called a 'rotator' at the National Science Foundation—rotated in for a couple years and then went back to Ohio State before I retired."

"All the more reason for us to be concerned." The agent's eyes flickered around the yacht. "Someone comes in for two years, gets rich, and retires. Surely you can see—"

"Okay, okay," I said, "I get your point. But there's a simple explanation. Give me ten minutes."

"No problem." The agent leaned back against the sun-bleached wooden railing of my yacht and folded his arms. "I've got as much time as you need. Tell me

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all about it."

I followed Mark Sanders through the stacks of the science library in the basement of NSF headquarters. A sickly fluorescent bulb flickered overhead, and I studied the back of Mark's head in the pale blue light. I had known Mark since we were graduate students together—he had slowly shed his facial hair over the decades as he climbed the administrative ladder. He lost his beard when he became Department Chair at Princeton. The moustache went when he became Dean. And now that he was a Division Head at the National Science Foundation, he was starting to go bald.

Mark stopped to pull an ancient bound volume off the shelves. He handed it to me—*Physical Review*, 1937. I riffled through the yellowed pages, which crackled and smelled of mildew.

"We're drowning in words," Mark said. He gestured toward the shelves of weathered journals, which stood at attention like soldiers from some long-forgotten war. "The number of published pages of scientific research doubles every decade. In the 1930s, *Physical Review* published a couple thousand pages a year. By the 1990s, it was up to 70,000 pages, and it's still climbing."

"Who cares, Mark? Nobody uses libraries anymore." I slammed shut the journal and glanced around. "Jeez, this place is deserted—you could grow mushrooms down here. Everything's online now."

"And that just makes the problem worse," said Mark. "Now we have to sort through gigabytes of digital drivel to find anything of importance."

"Hey, don't blame me." I pointed the spine of the *Physical Review* volume at Mark. "You NSF guys started it. You gave money to people for publishing a lot of papers, and so they did. Big surprise, eh?"

"I know, and now I want to control the problem," said Mark. "I brought you here as 'Assistant for Special Projects.' Now I've got a special project."

I dropped the physics journal, which landed on my foot with a soft thud. "Ouch! Mark, wait a minute. It's been a good year. My family's enjoyed all the Washington sightseeing, but I didn't think you'd actually want me to *do* something at the NSF. I have to keep my research program going, you know."

"Cut the crap, George. I know for a fact that you haven't published a worthwhile physics paper in five years. It's time to earn your pay here."

"I wouldn't even know where to begin," I said.

"Then look around Washington. Check out the other agencies. See if anyone has dealt with a similar problem." Mark turned the corner at the end of the bookshelf, then peered back at me. "And don't forget to turn out the lights."

"Well, what have you got to show me?" asked Mark, sliding a paper deftly into his outbox. "And what's in that bag you're holding?"

I dropped the brown paper bag onto a stack of papers on Mark's desk. "I did just what you said. It was the Department of Agriculture that gave me the idea." I reached into the bag and pulled out three potatoes, flaking dirt onto the desk.

Mark leaned over his desk and brushed the dirt onto the floor. "Potatoes, George? What the heck—"

"Let's say farmers are growing too many potatoes. That drives prices down, which is bad for everyone. So Agriculture pays the farmers not to grow potatoes." I dropped two of the potatoes back into my bag. "We've got the same problem—we pay people to write science papers, and they write too many. Let's pay them *not* to write."

Mark shook his head. "Whoa, we're not trying to get rid of all scientific research, just the bad stuff."

"Exactly. So we don't pay the good scientists to stop doing research. But when we get a mediocre proposal, we

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fund them to publish a little bit less for a few years. The worse the proposal, the more we ask them to cut back on their publication rate, and the more we compensate them. Maybe we could even automate the review process."

Mike stroked his non-existent beard, then realized it was gone and pulled his hand away. "Let me think about it."

The FBI agent shook his head. "Look, I know that the NSF eventually implemented your idea, but this is the government we're talking about, not Microsoft. Washington doesn't pay huge bonuses for coming up with clever ideas."

I nodded. "You're right, but that's not the end of the story." I went into the cabin and pulled out an envelope with the hands-around-the-world NSF logo on the front. "I've saved this as a memento. Read it."

The FBI agent slipped the letter from the envelope, unfolded it, and began reading aloud. "Dear Dr. McCarthy: Thank you for your proposal DMR-0808516. I am happy to inform you that your proposal will be funded for $21,750,000. You are asked to refrain from publishing any scientific papers for the next 3,137 years." □

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Into That Good Night

William Gleason

Theoretical models try to describe reality in ways both accurate and usable, but they need revision in the light of new data....

"Bob Roberts, that stuffed shirt, he's your boss?" laughed a grease-covered dockworker amidst the bustle of the loading dock.

"That's enough, Shirl," Dr. Meadows said as she fitted the neurolink cowl over Harry's scalp. "I know Bob-bashing is everyone's favorite pastime, but give this guy a break, will you? He just got here. Okay, Lamb, suit up."

Harry groaned and rose from the stool. "Doc, I told you, I'm checked out in the MAN. I even know what 'MAN' stands for—mechanized, automated, neurolinked. Isn't that enough?"

"You were certified on Earth where it's a convenient 1-g," Meadows said, turning to study the monitor that showed Harry's uplink pattern being copied into the computer. "But out on Sabre's surface, beyond the gravity-suppression plate FL-35 sits on, it's a most inconvenient 4.7-g. We have to be a bit more careful here."

Harry wasn't ready to surrender. "Look, I know the tokamak won't work near the grav plate, but it's not like I'm going to be *walking* the three kilometers every day!"

"Give it up, Lamb," Shirl said, as Harry sized up the giant black suit standing nearby. "Roberts insists on the check. The windbag is all talk and no substance, but he's got rank."

As his shaky fingers fumbled with the seals, Harry tried to ignore the small crowd that was gathering. He exhaled in relief as the imposing suit finally popped open, then he stared morosely into its

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complex innards, trying to recall the mnemonic that walked him through the entry steps.

"You sure you know what you're doing?" Shirl asked doubtfully.

"Yeah, sure," Harry said. "Uh, so Roberts is really that bad?"

A tall man in a gray jumpsuit took the bait. "Wait till you meet him! Never takes a turn minding his precious reactor unless newbies are inbound, then breaks his own rules and won't take a partner, not that there are volunteers. Might as well wait to get unpacked, Lamb, you're due for the slaughter—of boredom!"

"Not tonight he isn't," Meadows interjected through the chuckles. "If Roberts needs anything, somebody else will have to do it. You'll get your surface check tomorrow, Lamb. Right now it's engrams and a button-up—and I have three other people to process, so let's go."

SMASH! That was it! The acronym's first letter stood for "systems check." Harry reached out and triggered diagnostics. "Neuro uplink is green," he said. "Sensors online, shields green, structural integrity checks out. Biofeeds and dispensary are green."

"Ready to roll," said the doctor.

M is for "mount," Harry recalled just in time. He pulled open the leg flaps, turned around, and stepped back and up into the suit. As he shoved his arms into the sleeve constrictors, he continued silently to himself, *A is for "attach."* At Harry's mental command, the suit's armored exterior folded around him, and the inner lining inflated to conform tightly to his body. He sensed rather than felt the contacts on his skin as the MAN assumed biocontrol.

The second S is for "seal." Harry gave another wordless command and the MAN's outer armor shrank inward with a heavy sigh, completing the closest symbiosis between muscle, mind, and machine ever devised. It felt like a giant fist had closed around him. Many people said the suits made them feel powerful, but Harry just felt small.

Harry chewed his lower lip. For the life of him, he couldn't remember what the H stood for. The precious memory danced just beyond the ring of faces staring up at him expectantly. Then an amber light flashed. "Uh, I've got a leak indicator," he said.

"Close your faceplate, ditz!" Shirl shouted and stomped her foot. "Oh, Roberts is going to love you!"

Belatedly, Harry sealed the faceplate and the indicator light winked out, but he could still hear the riotous laughter. *Of course,* he thought, *H stands for "hood."* Feeling like the biggest jackass in three galaxies, Harry braced himself for the humiliation of having to ask whether he'd passed inspection. He was spared this indignity, however, when a loud siren began to blare.

A panicked voice sounded in Harry's comlink. "Shit! Roberts is trying to—"

There was a distant boom. Harry felt a pulse, the briefest constriction, and watched helplessly as the unprotected people around him were suddenly tossed through the air like a handful of socks. For a moment there was absolute darkness, until dull red emergency lamps revealed Harry as the only person standing.

A burst of static filled his ears. "—anyone? This is Dr. Roberts. Anyone there?"

"Yes," said Harry, the word emerging as a croak. "I'm here. Harry Lamb. There's been an explosion. I'm in a MAN suit. I've got injured."

"God, Lamb, I hope you're not an idiot," said Roberts, "because if you don't do exactly what I tell you, everybody on this planet is dead. Clear?"

Harry swallowed. "Yes, sir."

"Good. Do you know anything about fusion reactors?"

"Yes, sir, I'm a fusion tech. I know all about them."

"Great, another hotshot! Just please tell me you know what a magnetic energy dissipater is, and maybe we'll live

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through the day. This one needs a replacement power relay. Do you know what I'm talking about?"

Harry frowned. "Dr. Roberts, those things are pretty big. Maybe you should scram the reactor till we can fix things proper."

"I tried that, you idiot!" the disembodied voice bellowed. Harry would have cringed had the MAN let him. "Plasma containment is overheated, and fail-safes won't allow a shutdown without the dissipater! You want to argue with me?"

"N-no, sir," Harry stammered. He took his first awkward step forward as several people around him began to stir. "I'll load the contactor into a railcar and drive it out."

"Damn it, Lamb, I need you to pull it together!" Roberts exclaimed. "What are they teaching you kids? Things don't just happen, there are causes! Just before the alert there was an aborted discharge from the jump-gate generator. I know it's supposed to be impossible, but I'm guessing there was an energy backlash. Probably fried every coupling between here and the station. That explosion you felt had to be the main junction, which means the railroad is no longer running! Load the relay on a flatcar if you can and push it as far as there's track. After that, you'll have to carry it."

The parts bay was well organized, and Harry easily located the bulky, half-ton component. Lifting it barely taxed the MAN's considerable strength, but Harry suspected it would be different out in the heavy g. Unused to the suit's balance-gyros, Harry felt constantly on the verge of falling as he carried the L-shaped component toward the airlock. But at least the problem gave him something to focus on other than the people writhing in pain around him.

Dr. Meadows' voice sounded angrily in his ear. "Where are you going, Lamb? Get over here and help me!"

"Ignore that!" Roberts shouted. "Carry out your orders, Lamb!"

"Roberts, I have injured!" Meadows shouted back. "Looks like a damn bomb went off in here!"

"I need that contactor, Ann! Without it, there's not enough medicine in the world to help those people!"

The argument continued as Harry passed through the airlock and started down the path to the railway terminus situated just beyond the grav plate's rim. He paused before a large warning sign demarcating the edge of the field. A few paces beyond it stood the depot, from which three sets of tracks ran off in parallel. Poised on one of them was a flatbed railcar.

"Listen, Bob, I'm the ranking civilian on this station!" Meadows cried. "And I'm declaring a civil emergency! I need that MAN back here now!"

"Lamb, listen to me!" Roberts growled. "You say you know all about fusion reactors? Tell Dr. Meadows what's going to happen if we have a breach!"

To Harry, the decision was easy. Not comfortable, but easy. He stepped across a red and yellow striped line. He wouldn't have thought it possible, but even inside the suit he could feel a heavy weight settle onto his shoulders. A grunt escaped his lips. For a moment he teetered forward, barely managing to hang onto the relay.

He spoke through deep breaths as he approached the flatbed. "The Sabre FL-35 tokamak has fifty-four liquid-helium-insulated superconducting magnets." He laid the contactor on the railcar. "If insulation failed and a magnet got hot enough to gain resistance, it would continue to heat until it exploded, which would set off a cascade effect in the others. If they all shattered, we're looking at an explosion the scale of Hiroshima."

"Ah ah ah," Roberts chided as Harry put the railcar in neutral. "Don't forget that the dissipater is shot! Plus, the entire housing is encased in a forty-meter thick, neutron-absorbing blanket of liquid lithium. That'll certainly add to the fireworks if this baby goes off! It'll be like Christmas in Hell!"

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If Dr. Meadows was still listening, she offered no response.

Getting the railcar moving took enormous effort, as even the MAN's cleated soles slipped repeatedly on the icy surface. Harry began to wonder if it might not be easier to just carry the component the whole way, but finally the car gained momentum on the low-friction rails and the going got easier.

After a few long strides, Harry found himself engulfed in darkness. Even with the suit's optic enhancements, vision was grainy. The inky air seemed a tangible thing. Every few steps, Harry glanced back at the receding station to reassure himself there was more to reality than just the pale green data readouts scrolling inside his faceplate. Looking ahead, he was amazed he couldn't see the reactor. It was over ten stories tall, yet he couldn't discern even a silhouette against the dim stars on the horizon.

"Lamb, where are you?" Roberts demanded abruptly. "Look, we have another problem. Are you on your way?"

"Yes, sir," Harry panted. "I have the relay."

"Okay, shit, look, containment temperature's rising too fast. There must be damage to the magnets somewhere, probably a coolant leak. Jesus! Okay, I'm going into the basin, but I'm going to need a patch. Station? Station? Anyone?"

"This is Banyard!" came the surly reply. "We're kind of busy right now, Roberts!"

"Shirley, damn it, I need you to listen to me!" Roberts said. "I need a sheet of polyfib—"

"Forget it, Roberts!" interrupted the voice, which Harry now placed with the dockworker on the bay. "I'm sick of you thinking you know everything! My fucking arm may be broken, and Clutch is dead! You think I give a shit what you need?"

"Shirl, this is Harry Lamb. You've got to listen to Dr. Roberts. If we can't shut down the reactor, nothing else matters. There may be a—"

The flatcar Harry was pushing suddenly tilted and lunged forward. Harry, half stretched over the rear of the car, was yanked from his feet. He screamed as he plunged downward into darkness. A moment later he was jarred by a bone-rattling blow to his midsection. He sailed through the air to land in an awkward heap and then tried in vain to fill his flattened lungs as a million tiny lights exploded in his head. As the darkness groped for him, he caught snippets of conversation.

". . . need that contactor . . ."

". . . Lamb? Lamb, you still there . . ."

". . . shit, I found the rupture, lower deck . . ."

Harry's chest screamed in agony as the suit forced air into his lungs. A loud, eerie howl escaped his lips, and death loomed as a blessing. Then a soothing wave of coldness rolled through his body, washed through his brain, leaving him feeling pleasantly detached. Absently, he considered the grim medical data scrolling before his eyes.

"I've got broken ribs," he said. "Internal bleeding. The MAN says I need a doctor." He fought an urge to giggle.

"Can you move?" Roberts demanded. "Is the relay damaged?"

"Relay?" Harry repeated distractedly.

Roberts cursed. "Look, Lamb, the suit has pumped you full of painkillers, but I need you to focus, okay? Remember your orders. I need you to bring me the contactor. Can you do that?"

Harry forced himself to sit up. There was no pain, but he felt a grotesque crumpling in his side. Casting his gaze about, he spotted the partially hidden power relay. "I see it," he said. "It's pinned under the railcar. I'll get it." He only vaguely noted the ongoing conversation in his headset as he slowly gained his feet.

"He may need help, Banyard!"

"Fine! I'll send out a suit and a patch when I can, okay?"

"Thank you!"

"Yeah, and fuck you, too!"

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It wasn't until he was reaching for the contactor that Harry realized he couldn't move his left arm. A quick check showed the suit to be undamaged. It took several seconds after that for his addled brain to realize that the suit had deliberately immobilized the arm because of his injuries.

He grabbed the relay with his right hand and tugged. It inched forward. The railcar lay at a precarious angle and shifted slightly with every pull, but Harry saw no alternative. When the relay finally came free, the flatbed dropped and rocked dangerously before growing still. Exhausted, Harry fell to his knees.

"Got it," he murmured. "Dr. Roberts, I got it."

"Good boy!" Roberts said. "I need you to bring it here. There's not much time."

"Yes, sir," Harry said. He pushed himself to his feet. With only one arm, he could no longer carry the heavy piece of equipment, so he dragged it across the rubble-strewn floor of the blast crater. With no frame of reference, he had to trust the sensors to guide him.

As he labored, Harry listened as Roberts grumbled, seemingly more to himself than anyone who might be eavesdropping. "Shit, the duct tape won't hold! The insulation's too cold! Damn, I need that patch!"

As the ground beneath Harry began to slope upward, it became increasingly difficult to make progress. Eventually he found himself standing on a steep incline and straining just to keep from sliding backward. The lip of the crater seemed light-years away.

"Dr. Roberts, I'm stuck," Harry said. "I can't use my left arm and the hole is too deep. I can't make it."

"You have to!" Roberts shouted. "Lamb, you have to try!"

"Yes, sir," Harry said. "I am." He gave a mighty pull that moved the contactor upward, but as he tried to take a forward step he lost balance; both he and the relay slid downhill. "I'm sorry," he panted. "It's too slippery. I'm sorry."

"All right, Lamb, this is Banyard. Vic and I are suiting up. We'll be there soon as we can."

"Too long, damn it!" Roberts snarled. "Okay, just get over here with the patch." There was a pause. "I'll help Lamb."

Harry stood his uneven ground in a state of limbo, unable to go up and unwilling to go down. The suit diagnostics spat dire medical alerts at him throughout the long wait, until Harry finally canceled the feed. He felt a childlike relief when he spotted the faint flicker of light approaching from above.

"That you, Dr. Roberts?" he asked, regretting the silly question immediately.

"It's me," came the man's raspy voice over the comlink. "We'll pull together, okay? Go!" Powerful legs churning, the two hauled the relay out of the pit.

"Slave over," Roberts said as his MAN lifted the contactor. The haggard voice didn't invite debate, not that Harry felt inclined to offer any. He gave the command that slaved his suit to the other, then drowsed, lulled by the comforting whir of the joint rotors as his MAN effortlessly followed his boss in lockstep down the tracks.

The light inside the plant was only marginally better than that outside. Failsafes had triggered backup generators, but in the MAN-sized hallways the tepid emergency lights were easy prey for the ravenous gloom. Harry nodded distractedly as Roberts led him past the control center and into the facility's heart. For a moment, it all seemed a bad dream.

"Wake up, Harry! Damn it, wake up!"

Harry blinked. "Yeah, I'm up," he said.

Roberts had placed the replacement component on the floor beside the towering dissipater. The old power relay was a charred ruin. It was all too real.

"Harry, I'm having trouble seeing," Roberts said, his voice garbled. "You'll have to do it."

Anger welled up in Harry. "Suit malfunctions? God! Can't we catch a break?"

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"It's okay," Roberts said. "Shifting control to you. Let me do the heavy lifting. You do the fine work. You can do it."

A new control screen opened in Harry's field of vision. He'd never remote-operated a MAN before, but the controls were intuitive. He forced himself to focus, maneuvered Roberts' suit to support the damaged component, and began employing his own suit's power tools to detach the unit from the dissipater housing.

"This is Banyard," came a voice in his headset. "We're through the crater and approaching the plant. Where do you want the patch, Roberts?"

When Roberts didn't respond, Harry said, "Head for the control center. Scram the reactor as soon as fail-safes are green, copy?"

"Copy that. We're on our way."

His bloodstream coursing with biomeds, it took all of Harry's willpower to control the other MAN and stay on task. Sweat streamed down his face as he had Roberts' MAN slide the replacement contactor into place so Harry could begin splicing the interfaces. Though it was only minutes later that Harry began bolting the equipment in place, to him it felt like an eternity.

"There!" he said at last. "Shirl, check the board. Can you scram?"

"Hold on," she said. Harry held his breath. "Yeah, we're green. I'm shutting her down."

Relief flooded through Harry as he climbed to his feet even as the dissipater roared into life. "We did it, Bob!" he cried. "We did it!"

There was no response. "Bob? Shit, you lose audio, too?" For the first time, Harry turned to look into the other MAN's faceplate. He shook his head, uncomprehending. The hood was empty.

A terrible fear burned through all the drugs in his system to settle in Harry's gut. "Shirl, grab the patch and meet me in the basin!" he shouted, starting for the door.

Still slaved to him, Roberts' MAN obediently followed Harry down a long corridor and through the portal that led inside the innermost blast shield. Normally, Harry would have paused in awe at the sight of the towering outer wall of massive ring magnets that contained the fusion plasma. Now, he hardly noticed it as he cast his gaze about, finally spotting what he'd feared. "No," he whispered as he started forward. "Oh, God, no."

The man stood like an unfinished sculpture in a swirl of cryogenic fog, his extremities buried in clots of blue-hued ice. He wore a transparent emergency enviro-suit and a neurolink cowl, and he was pressing what looked like a thin mattress against a bleeding wound in the magnet casing. He was frozen in place, limned in a hoary frost, a statue of Sisyphus pushing his boulder in Hades.

Harry saw how it must have been, Roberts remote-operating his MAN to help Harry, while he'd remained in the basin to do what he could to slow the leak. Harry blanched as he considered the superhuman effort it must have taken just to stand in the 4.7 g. But of course, Roberts would have known it wouldn't take long for liquid helium to freeze his hands in place. Harry tried to imagine it, how Roberts' mind had toiled elsewhere even as his body had gradually succumbed to the greedy cold beside the wall.

Harry turned as a MAN entered the basin carrying a roll of polyfiber. "It's Banyard. Where's . . . ?" She stopped. "Oh, my God, is that . . . ?"

Harry stepped forward and seized the patch. "Screw you!" he yelled. "Screw all of you! Bob Roberts is the bravest man I've ever met!"

He turned back, eyes welling. "Don't worry, sir," he whispered. "You saved her. You saved us all." ■

(Acknowledgment: The author would like to recognize Tom Ligon for his invaluable assistance during the writing of this story.)

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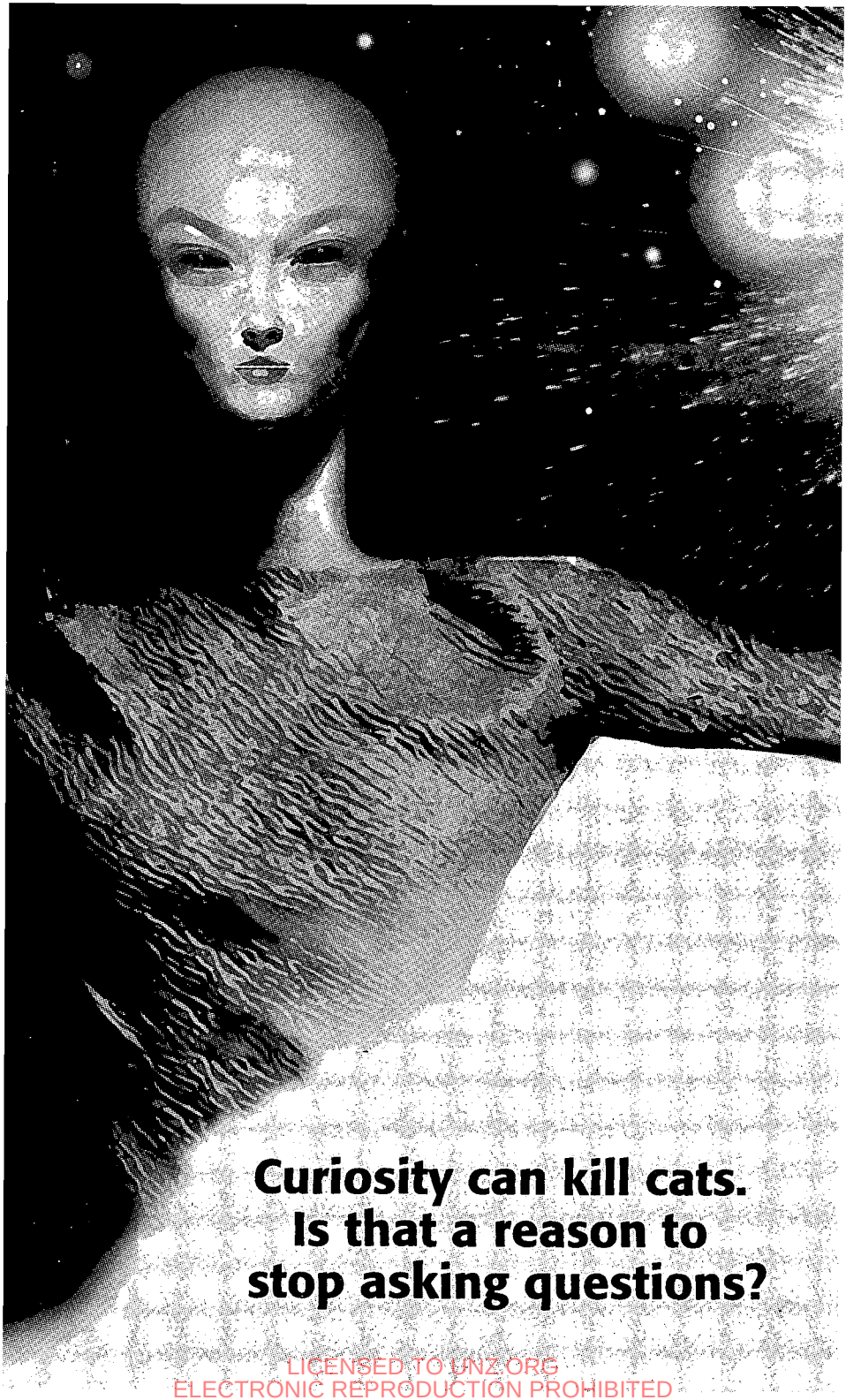

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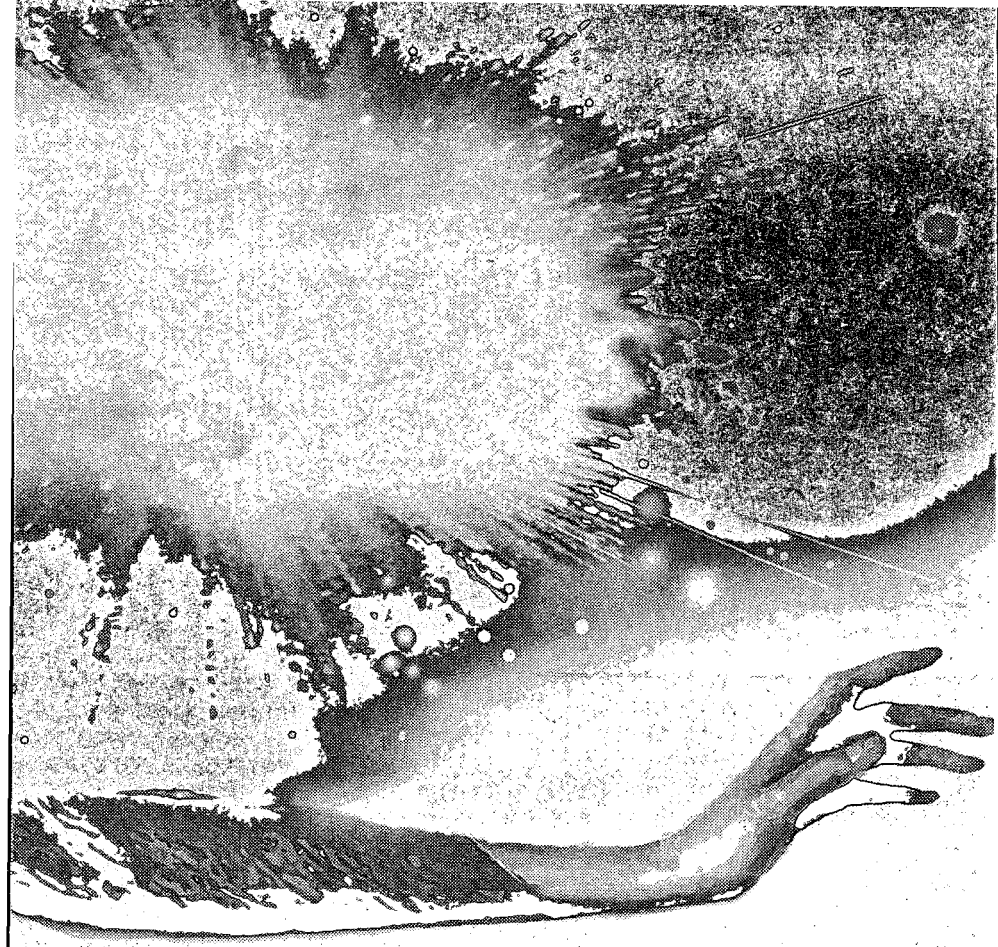

The Anthropic Precipice

Jerry Oltion

Illustration by Vincent Di Fate

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The alien slipped into the elevator just as the door was closing. David didn't realize she was inhuman until after the car had begun to rise, but when her subtle differences worked their way into his hindbrain, his reaction was instinctive and uncontrollable. He flattened himself against the back wall, his hands out in front of him in readiness for combat, or just to ward off the strangeness so close to him; he couldn't have said which.

"Don't be alarmed," the alien said. "I just want to talk to you." She was humanoid enough to pass in a crowd. Five feet two or so, with arms and legs and head in the right places, but her arms were too long and her head too large on too long and slender a neck. She wore big oval sunglasses that didn't quite cover her eyes even though her nose seemed a mere afterthought between their huge lenses. Her blond hair fell to her shoulders in smooth, glistening waves that were too perfect. Clearly a wig. And while her smell wasn't unpleasant, it was definitely unusual. Fruity, like a sweet red wine. Any one of her differences might have been explained away as simple deviation from the norm, but taken together in close quarters they screamed out *alien*.

"What . . ." David said. His voice cracked. His mouth was too dry to swallow.

"You're here to deliver a paper on the dark energy density of the universe," she said.

He nodded. "Here" was the International Symposium on Fundamental Constants, in San Francisco. And until about five seconds ago, one of the fundamental constants in David's world was the knowledge that space aliens were a figment of the overactive imaginations of crackpots and charlatans.

This alien seemed as real as rocks. She looked a little like a classic "gray" from the flying saucer myths out of the '50s, though not so exaggerated, and her skin was more brown than gray. In the lobby of the hotel, seated, with a newspaper in front of her face, she would have blended right in. And she had apparently been waiting for David.

"You intend to propose an experiment to measure that dark energy density in high-energy reference frames," she said, her voice soft but penetrating.

His muscles didn't want to unclench. He forced himself to lower his arms anyway. It seemed that she wasn't going to attack him just yet. "I . . . do," he managed to croak out.

"Reference frames such as those found at the beginning of the Universe," she added.

"Right."

"That's an unusual approach to determining the flatness of space."

He was having a hard time concentrating on her words. What happened to "Take me to your leader" or "We come in peace"? Humanity's first alien contact should have been on the White House lawn or in front of the Great Pyramid of Khufu, not in an elevator in a hotel in San Francisco.

"What do you want with me?" he finally managed to ask.

"I want you to fumble your presentation."

David's stomach rose into his throat, but it was only the elevator slowing. The door opened to an empty hallway. The alien stepped out and held her hand across the sensor to keep the door open. "This is your floor," she said when he hesitated.

"You want to go to my room."

"We need to talk."

"How do I know you won't—"

"If I wanted to harm you, I could have done it with much less risk to myself than this."

He hadn't considered that she might be afraid of anything. She was an extraterrestrial being, presumably arrived by spacecraft that could travel interstellar distances. She must be as far beyond David as David was beyond a caveman. Then again, David supposed he wouldn't

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fare all that well in a fight with a Neanderthal.

He had to look at the number the desk clerk had written on his key packet. "Twelve twenty-six," he said.

She followed him down the hallway and waited patiently while he took two tries to fit his card in the lock and open the door. Once he got it he considered rushing through and slamming the door in her face, but he didn't imagine that would stop her for long, and now that he had lived for—what, a full minute in her presence?—his curiosity was beginning to get the better of his xenophobia.

The door swung open to reveal the bathroom to the right, and a queen-sized bed and a table and chairs straight ahead. At the far end of the room a glass door led out onto a balcony only a couple of feet wide. An oversized television dominated the low chest of drawers opposite the bed. David held the door while the alien woman walked in and pulled out one of the chairs beside the table.

"I won't bite," she said. She sat down and folded her long arms over her chest. Were those breasts there, or did her chest just bulge out on top?

He let the door swing closed behind him. The latch sounded like a gunshot and he flinched almost as hard as he had in the elevator. This wasn't how first contact was supposed to go.

Then again, this probably wasn't first contact, was it? Her appearance was too close to the stereotypical alien to be coincidence.

"So how long have you been watching humanity?" he asked as he sat on the edge of the bed. He realized he was sweating. He had dressed in a suit for travel because you never knew when you would bump into the one person who could approve or deny your grant. Half the business at these conferences happened at random, it seemed. But he wasn't used to jackets and ties any more than he was used to aliens in his room, so he loosened the tie and opened the top button of his shirt.

She made a little quivering motion with her head. "A while," she admitted. "Long enough to learn your language."

"And a lot more than that," he said. "You know what I'm going to present in my talk tomorrow."

"Computer security is an oxymoron," she said. "And people like you are our primary interest."

"People like me."

"Right. People who define the physical constants of the universe."

His throat was still dry. He got up and went into the bathroom and unwrapped one of the glasses by the sink, filled it with water, and downed half. He refilled it and took it back out into the hotel room, this time pulling up the other chair and sitting opposite her at the table.

He said, "If I'm lucky I might discover a physical constant, or refine our understanding of one a bit. It would be the height of hubris to think that I actually define them."

She took off her sunglasses and smiled. He had expected to be repulsed by her face, but her eyes were more round than almond-shaped, and they gave her a babyish, teddy-bear look. "You underestimate yourself," she said. "Right now you're probably the most powerful—and by extension the most dangerous—being in the galaxy. Maybe in the entire universe."

He snorted. "Yeah, right."

"Seriously. If you succeed in getting the collider time to create a mini Big Bang, and if you succeed in measuring the dark energy density at the moment of quantum disentanglement, you will define the most influential property of the universe. Not describe it; define it. Because reality is consensual. The observer determines the outcome of the experiment. The physical constants of the universe aren't nailed down until someone observes them."

"And you're afraid I'm going to observe the wrong constant for dark energy?"

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"That's right. As it is, the fuzziness of our measurements makes the universe compatible with life. And the anthropic principle ensures that when we make a more precise observation, that refined constant is also compatible—otherwise we couldn't be here to make the observation."

"So what's the problem?" David asked. "If I refine the value some more, it's guaranteed compatible with life."

She pointed an unnaturally long finger at him. "In the present-day universe. But you'll be studying the moment of creation. You'll be defining the constant that determines the flatness of space, which determines the ultimate fate of the universe. Whether it collapses into a big crunch or expands gently forever or flies apart like a supernova is up to you."

"Have you been watching *What the Bleep Do We Know?*" he asked. That one movie with its woo-woo approach to reality had done more damage to science than any amount of falsified data.

Someone knocked on the door just as she opened her mouth to reply.

"Probably the bellhop with my bags," David said. He got up and answered it while she put her sunglasses back on and turned away.

It was Trevor Oatley, a high-energy physicist from England he'd collaborated with on a paper last year.

"David!" Trevor said. "Saw you getting on the lift just now. I hear you're—"

"Occupied at the moment, I'm afraid," David said. "Could I meet you later in the bar?"

Trevor lost his smile for a second, then he noticed David's loosened tie and his smile flashed back even brighter. He made a show of peeking around David into the room, then said, "Right. Take your time. I'm in four pi, just down the hall." He turned away with a wink.

David started to close the door, then saw the bellhop trundling down the hallway with his bags on a cart. David dug out his wallet and gave the guy a couple of bucks at the door, then carried the bags in himself and set them next to the bed.

"So what am I supposed to—" he began to ask, then he stopped. Her chair was empty. The balcony door was open, the curtain billowing inward in the breeze off the bay. He cautiously stuck his head out the door, but she wasn't on the balcony, nor on the ones to either side nor below. He looked upward and saw a dark speck rising toward a lens-shaped distortion in the clouds. Within seconds the speck disappeared and the distortion streaked away toward the west.

"So what am I supposed to do now?" he asked the empty sky.

An hour later, over a pint of Anchor Steam with Trevor, he tried to think of a way to broach the subject without sounding like he'd lost his mind. "What do you think about consensual reality?" he finally asked. "Is there anything to it?"

"Hogwash," Trevor said immediately. "Blather put out by the ignorant to make them feel more connected to something they don't understand. Gives 'em a sense of control, maybe. But Newton didn't invent gravity, and Einstein didn't invent relativity; they just described it."

David watched the foam in his beer: tiny bubbles popping on top, constantly replaced by new ones on the bottom. "What about M-theory? What about all those extra universes that pop into being every time someone makes a choice? Some of them are hostile to life, yet we keep choosing the branch that we can live in. Isn't that consensual reality?"

"M-theory is probably hogwash, too," Trevor said. "The universe just *is*. We can observe it, and we can play a few tricks with it on the subatomic scale, but making it up as we go along? Ha."

David wished he could be so confident. Until this afternoon he had been that confident, but meeting an alien had shaken his model of the universe profoundly. It would almost be easier to believe that he hadn't met her, that he had

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hallucinated the whole encounter, yet he couldn't quite bring himself to doubt his subjective reality to that extent, either.

He wondered if the alien was a manifestation of millions of people believing in her. Did she have a home planet around some other star, or had she just popped into being out of the quantum foam when enough people believed that there had to be aliens observing Earth?

"What's got you so introspective all of a sudden?" Trevor asked.

"Woman problems," David answered.

"Ah, right. Now there's a consensual reality issue for you."

She wanted him to blow his talk, no doubt so he wouldn't receive collider time for the dark energy experiment, but he wasn't about to kill his career over a mysterious conversation with a person—alien or no—who wouldn't stick around to prove her point. If she wanted life-changing concessions from him, then she had better offer life-changing compensation.

As soon as he thought that, he realized that he couldn't be bought. Even if she gave him the secret to her stardrive, he would still want to perform the dark energy experiment. Understanding the moment of creation—and all that came afterward—was bigger than anything she could possibly give him.

He slept fitfully that night, twitching at every sound, expecting his mysterious visitor to show up again to finish her argument, but she never showed. He showered and shaved and dressed in his suit and then rescued his notes from under the mattress before he headed out for the conference.

His talk wasn't until mid afternoon. He attended two others, but had a hard time concentrating on what the speakers were saying. He kept eyeing people in the audience, wondering if any of them were aliens in disguise. He wondered if the people giving their presentations had received visits like he had. Were they twisting their own words at the aliens' request?

He briefly met with Arnold Wittstein, the new director of CERN, who ran the Large Hadron Collider that would provide the energy for David's experiment if they approved his request. Arnold seemed a little aloof, but David couldn't tell if it was just his normal reserve after being pumped for collider time by every physicist at the conference or if the aliens had gotten to him, too.

There was no way to ask. That was the agony of this whole situation: knowing for sure that aliens existed—that the universe harbored life other than humanity!—and not being able to say a thing about it to anyone. Oh sure, he could now phone up Whitley Streiber and have a dandy conversation with him and blow his scientific credibility in the process.

The more he thought about it, the angrier he became. Who did these aliens think they were, anyway, skulking around in the shadows and meddling in people's business? Why didn't they just come out and greet humanity openly like decent neighbors?

By the time for his presentation, he had worked up enough righteous indignation to power him through the jitters he usually felt in front of a crowd, and he dived into his speech with a fervor that surprised even him. He saw several people get up and move forward to closer seats, and someone else got up and hustled outside, to return moments later with half a dozen more people in tow. People kept trickling in as word spread that this was a talk not to miss.

David had seen this happen before to other people. It was often the turning point of their careers. The eye of the entire scientific community was focused on them for a moment, and if they managed to make their point, they were golden for years.

And David was making his point. He had explained the physics of what he intended to do, and why measuring the

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dark energy density during the conditions at the beginning of time would tell them how the universe would evolve. All that was left was to prove it.

"So now comes the time to trot out the charts and graphs," he said, sliding his DVD into the computer connected to the projector. He felt a strange calm descend over him. He had tested the DVD beforehand and the images on it had displayed fine. He had pulled the wireless connection from the computer so nobody could hack into it from outside. He had a backup DVD and a backup computer in his briefcase just in case. If the aliens were going to stop him, it was going to take a fire in the lobby.

The first slide flashed up on the screen, a wide oval of mottled greens and reds and blues. David said, "Most of you are familiar with the cosmic background radiation as measured by the WMAP probe. That measurement established once and for all the validity of the Big Bang model of the universe. It even established some fairly rigorous parameters for the—"

The lights went out. There wasn't even a flicker, just instant darkness. Someone in the audience called out, "It's the big crunch!" and there was a ripple of laughter.

It's the goddamned aliens, David thought. Aloud he said, "It's FermiLab. They want to be first with this measurement." That got another round of laughter, probably at the thought of the American lab still trying to compete with CERN after decades of stingy funding.

Points of light flared up in the audience as people pulled keychain lights out of their pockets. David said, "While we wait for the power to come back on, let me tell you a little about the experiment itself." He began to describe the apparatus and how it would use standing waves to multiply a particle beam's density for the femtosecond needed to take his measurement. He had to speak loudly to be heard without a microphone. He imagined himself speaking to an alien in the basement, a little gremlin by the circuit breaker who would soon be nabbed by hotel security, and his voice carried like a Broadway actor's.

Emergency lighting flickered on after a few minutes, but the projector remained dark. It eventually became apparent that the main power wasn't coming back on any time soon. Someone entered the room and interrupted David to say, "Looks like the whole city is out. Oakland, too."

"All right, then," David said. "Let's call it a day here. I'll be happy to finish my presentation whenever the conference committee can reschedule it." He knew his moment in the spotlight was over, though. Rescheduled talks were always sparsely attended, and a rescheduled fragment of a talk would be lucky to draw the speaker's own mother.

Even so, Arnold Wittstein came up to him as everyone else was filing out of the room and said, "That was an excellent presentation. I want you to meet the rest of the scheduling committee."

They arranged to meet for dinner. David fidgeted the hour and a half beforehand, hanging out in the bar rather than going up to his room. He felt safer in a crowd. If the aliens would shut down the power to the entire city, who knew what they would do to him if they could get him alone.

He met the CERN people in the lobby. Trevor had wangled an invitation, so with David, there were five; too many for a regular taxi. Arnold introduced the two David didn't know—Michelle and Bernard—while they waited for the doorman to hail a van.

When it arrived, they piled in and headed for Chinatown, making small talk about the power outage, which had been traced to a transfer station malfunction twenty miles away. David wished he could tell his companions what had really happened, but he knew how that would go over.

Then the van shuddered, and the inte-

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rior lit up bright as day. The driver shouted something in Farsi and stomped on the brakes, but the van only slowed for a second before its tires left the ground and it continued on—and upward as well.

"Those bastards!" David said.

Everyone turned to him, but there was no time to explain. He leaned across Michelle and yanked open the sliding door. "It's me they want. Quick, bail out while you still have the chance."

Michelle looked at the rapidly receding pavement, lit up like a concert stage. Cars were swerving left and right and smashing into one another. "I think I'll take my chances in here," she said.

Trevor was on the left side; he craned his head to get a look upward. "Flying saucer," he said. "Ring of lights around the rim. Big opening in the middle where the brightest light's coming from. So these are friends of yours?"

"I wouldn't say 'friends,' exactly," David said. "One of them accosted me in the elevator yesterday. She was in my room when you came by, trying to talk me out of doing my dark energy experiment. Said I could accidentally determine the wrong constant and blow up the universe."

"Ah," said Trevor.

"You can understand why I didn't say anything then."

"Yes, well, this rather changes the picture now, doesn't it?"

"It does," David said, amazed at how relieved he felt. Here he was being abducted by aliens, and he was just happy that he could finally talk about it openly. "I don't think they'll hurt us," he said.

"Speak for yourself," Trevor said. "They'll fiddle with our memories, if there's anything to the reports of other abductions. And I'm not particularly keen on being buggered by medical probes, either."

Bernard said, "They want to keep you from taking your measurement?"

"That's right."

"And if we promise them this, they will let us go?"

"Probably."

"Then we will promise."

"You'd just give in to them like that?"

He laughed. "In the face of this technology, I would be a fool not to." He turned in the seat and winked at David.

"You're . . . right," David said loudly, for the benefit of whoever else was listening. "In the face of this, we would be fools not to agree to whatever they want."

The flying saucer began to move while the van was still rising into its body. They were already over the ocean and moving west by the time the van rose into the interior and the floor irised closed beneath them.

The chamber they arrived in was festooned with equipment. Trevor and Michelle pulled out their cell phones and snapped pictures like mad until a door slid aside in the wall and an alien stepped through, and Trevor even got a couple of shots of her. It might have been the one from yesterday; David couldn't tell. This one was female, too, but she was in her own element this time, dressed in a white bodysuit that left no doubt just what she looked like. Her limbs were supermodel thin, and so was her body. Only her head was larger than normal, but without the wig and sunglasses it looked right on her. It looked better than right. Here, in context, she was as right as a lioness on the veldt.

She carried no weapons, but she wore an aura of total control. She walked up to the side of the van and crossed her arms over her chest. "You don't listen very well," she said.

"You weren't very convincing," David said.

"How about now?"

"You've got our attention."

"So I do." She blinked her big eyes a couple of times, then said, "Come on out of there. I might as well give you the tour."

David looked at the others. Nobody

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moved. The cab's dispatch radio hissed softly with static. Then the cabbie reached out and turned off the meter. "No charge for waiting," he said.

What followed was any scientist's dream, and several scientists' nightmare. The alien showed them gadgetry that boggled their minds: antigravity generators and reactionless thrusters and time-distorting fields and more. It was exhilarating to know that such things were possible, yet frustrating to realize that they had already been invented.

"Are we always going to be following in your footsteps?" Trevor asked.

"Why do you think we keep our distance?" the alien answered. "We don't want to ruin your fun any more than we have to."

"But you think you have to in David's case."

"That's right."

"So what will you do now?"

She wiggled her head in a quick shiver. "We could wipe your brains back to infancy if we wanted to. The five of you are pretty much the whole source of the problem. However, that seems a little extreme. We're trying a more subtle approach."

"Subtle," Trevor said with a laugh. "Like abducting us right out of the middle of a crowded street."

"You forced the issue," she said. "Don't force it further if you know what's good for you. Now it's time for you to go." She had been walking while she talked, leading them back into the chamber where their van waited. The cabbie was leaning against the driver's door, smoking a cigarette.

Arnold said, "What? You're giving us a glimpse of all this and just sending us on our way?"

"That's right. We're letting you off with a warning. Be careful what you look for when you tinker with the fundamental constants of the universe."

"Come on," Arnold said. "We must be one of billions of species in the universe, any one of which could be defining universal constants at any moment. You yourselves must have defined practically everything eons ago."

"We did quite a bit, yes," the alien said. "Until we realized how dangerous it was. We've never forgiven ourselves for pi. But you're quite wrong about the number of civilizations in the universe. Intelligence is rare, and technology is even rarer. And societies that survive technology long enough to probe the secrets of the Big Bang, well, if there are any others besides you and us, we haven't found them." She nodded toward the van. "It's time to go," she said again.

"How do we get in touch with you?" David asked.

"You don't," said the alien. "Not if you know what's good for you. Now get in the van."

David thought about rushing her and trying to take over the flying saucer. She kept saying "we," but she was the only alien they had seen on board. On the other hand, even if she were alone, she must have been protected somehow. He wouldn't have let a caveman in his car without restraints.

The others got back in the taxi, and he reluctantly followed. He had barely closed the door when the bottom irised out from under them and they dropped—thankfully no faster than an elevator—to the ground. A moment later the light winked out and the flying saucer slid away into the night.

They were on a two-lane road, empty at the moment save for them. Just over the horizon was the skyglow of a major city.

"Now what?" said Trevor.

Michelle was thumbing buttons on her phone. "My photos are still there," she said.

"This doesn't make sense," Arnold said. "They abduct us in the middle of the city, with hundreds of witnesses, leave our memories intact, let us take photos, and leave those intact; it's like they want to be exposed."

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"They want us to try," David said. "But what do you think would really happen?"

"If five internationally renowned scientists came out to say we'd met . . . aliens?" Arnold's voice lost its excitement. "Ah, right. Five or fifty, they'd still think we were loony."

"And that would be the end of our careers."

There was silence in the car for the space of a few breaths. It was the cabbie who finally broke it. "You are seriously? Not talk about this to anyone?"

"Not us," said Trevor. He flipped open his phone and checked his photos, then handed the phone to the cabbie. "You're welcome to do whatever you want. Say you dropped us off before you were abducted, and I left this on the seat. Say whatever you want, as long as you leave us out of it."

The cabbie looked at the phone, then slowly shook his head. "No," he said. "Not for all the riches in the world."

"Smart man," said Trevor. He snapped the phone shut. "Okay, then. This never happened." He turned to David. "How about you? Are you still going to do your dark energy measurement?"

David thought about it. The alien woman had gone to considerable trouble to scare him out of it, but she hadn't stopped him. She had only warned him. Warned him that he could destroy the universe if he looked for the wrong thing. But in that warning was the implication that he could preserve the universe forever if he found the *right* thing. If the dark energy constant was just exactly right, the universe could expand forever, empty space regenerating new matter at just the perfect rate to keep galaxies and stars and planets forming for all of eternity.

"I'm, uh, I'm going to do some more calculations first," he said. "Maybe ask for some collaborators to make sure I know what I'm looking for. Then, yeah, I'll do it. It's going to happen eventually somewhere. Let's make sure it gets done right." ■

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Marsbound

conclusion

Joe Haldeman

"The tip of the iceberg" is what you see. Where is the rest? "Underwater" may be a gross oversimplification. . . .

Parts I & II synopsis

Mars needed families, or so some thought. **Carmen Dula,** *nineteen and with no special training, was part of the experiment that allowed married scientists to bring children to the planet's "colony." if you can call a hundred scientists and engineers that. (Most of them were in favor of it, but a strong minority, including the chief administrator* **Dargo Solingen,** *thought it was a waste of time and a distraction.)*

In the course of flagrantly disobeying orders, Carmen had an accident and was rescued by strange Martians—who were evidently no better adapted to martian conditions than humans were. They had lived for thousands of years in an underground colony of their own, in an environment similar to a high mountain on Earth.

They didn't look like anything from Earth, though, with four arms and four legs and a head resembling an old potato, including eyes.

Ignorant of science, they nevertheless lived in a pocket of high technology, with self-repairing machines that kept out the martian cold and near-vacuum. The technology came from the ones that brought them or sent them to Mars, millennia ago, the almost mythical Others.

The machines around them had begun to receive radio signals from Earth in the late nineteenth century, television in the twentieth, and cube in the twenty-first. They absorbed human language from those, and something of human learning.

Carmen was the unofficial ambassador to the Martians, through their leader **Red,** *who had rescued her and was therefore responsible for her. Unfortunately, she also became a disease vector, passing on the martian "pul-*

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monary cyst," which to them was just a normal part of growing up, to the colony's children. It was a gruesome and apparently life-threatening disease, which the Martians cured easily.

It made no sense; it was like a human catching a disease from a trout. Whatever the explanation, it was obvious that humans who had been near the Martians would have to be isolated from contact with other people, and all of Mars quarantined.

To study the creatures, an orbiting facility called Little Mars was built near Earth's Space Elevator, where a few Martians and a few humans, presumably infected, could be studied like coddled bugs. Carmen and Red were among the first.

III. SECOND CONTACT

1. Setting the stage

Red says that Americans in the middle of the twentieth century used to call this sort of thing a "crash program," which sounds ominous. Like when America had to build an atomic bomb to end World War II, or when Russia had to beat America into space to prove that communism worked.

Whatever, the effort to build Little Mars in orbit was the biggest and fastest piece of space engineering in this century, severely denting the economies of the eight countries and multinationals that banded together to get it done. It made the orbital Hilton look like a roadside motel.

The size and complexity were partly due to the ground rules driven by fear of contagion. The lung crap, Martian pulmonary cyst, proved that diseases could move from the Martians to us, through a mechanism that couldn't yet be explained. So for a period of some years, no one who had been exposed to the Martians could come in direct contact with humans who had not. Some said five years and some said ten, and a significant minority opted for forever.

The argument for forever was pretty strong. Our getting the lung crap from the Martians was less likely than getting Dutch Elm disease from a tree. More outlandish, actually, since I was part of the disease vector—it was like getting Dutch Elm disease from a person who had touched a tree that had once had the disease. But it *had* happened, and until scientists figured out how, anyone who had been exposed to the Martians had to be biologically isolated from the rest of the human race. That meant all of the 108 people who lived on Mars at the time of the Martian "invasion" of our living space—110, counting embryos—and especially the fourteen of us who'd been infected.

(I was not the most popular woman in the world, whether that world was Mars or Earth, since if I'd had the decency to die for disobeying orders, none of this would have happened. There were people on Earth who thought I should be imprisoned or even put to death for being a traitor to the human race. But we would have run into the Martians in a few years no matter what.)

So Little Mars was two space habitats physically joined, but biologically independent from one another. We had separate life support systems, with different environments.

It was as if you had two large houses filling a couple of acres of land, which had separate entrances and shared an interior wall with no doors and only two windows.

Their actual shape, viewed from space, was a pair of conventional toroids, like two doughnuts stuck together. They rotated fast enough to produce the illusion of normal Martian gravity. Two extensions, like pencils stuck on either side of the top doughnut, gave earth-normal gravity for our exercise rooms, and a little more oxygen. Otherwise, our toroid—the "Mars side"—matched the conditions in the Martians'

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underground city.

I'd never been to the Earth side, and might never be allowed there, but I knew it was sort of like the Hilton, but bigger and more spartan. It might have as many as a hundred people, maybe thirty of them more or less permanent staff. The others were visiting scientists and scholars and dignitaries. Fewer dignitaries as the novelty wore off.

The Mars side was half farm, raising a selection of mushroom-y crops, tended mostly by the four Martians who eventually lived with us. Sometimes we'd pitch in and help with the planting and gathering, but that was largely a symbolic gesture. Their food practically grew itself, sort of like mold or mildew, and we weren't going to share it with them.

We humans lived on a combination of simple rations and the most expensive carry-out in history, box lunches from the Hilton, which floated less than a mile away, across from the Space Elevator.

The Mars side and the Earth side had only two panes of glass separating them, but they were literally worlds apart. Everything living in our little world came from Mars; all of theirs was an extension of Earth. And the twain would not meet for five or ten years, or ever.

The fact that going to Mars or to our side of Little Mars meant exile from Earth didn't stop people from volunteering. Lots of scientists were willing, or even eager, to make that sacrifice in order to study the Martians close up, here or on Mars. It gave our small population some variety, people staying with us for some months before going on to Mars.

Little Mars took three years to build, during which time I finished my bachelor's degree, a hodgepodge of course work and directed research and reading that added up to a triple degree in linguistics, literature, and philosophy, with a strong minor in xenology. My lack of facility with mathematics kept me from pursuing biology and xenobiology to any depth, but I took all the elementary courses I could.

The trip from Mars was interesting. The life support in both the lander and the zero-gee middle of the ship were adjusted to affect a compromise between human and Martian needs and comfort levels. The two living areas were kept warmer for the humans and colder for the Martians. They weren't closed by airlocks, just doors, so I could go visit Red at his home if I bundled up.

Getting to LMO, low Mars orbit, was a challenge. The Martians, mostly through Red and me, worked with engineers on Earth to develop modifications to the acceleration couches so they would work with four-legged creatures who can't actually sit down.

There was no easy way to estimate how much acceleration the Martians could handle. The return ship would normally reach 3.5 gees soon after blasting off from the Martian surface. That was more than nine times Martian gravity.

Humans can tolerate four to six gees without special equipment and training, but there was no reason to generalize from that observation—keeping the acceleration down to six times Martian gravity. Much less, though, and we wouldn't be able to make orbit.

We were learning a lot about their anatomy and physiology; they didn't mind being scanned and prodded. But we couldn't wave a magic wand and produce a centrifuge to test their tolerance for g-force.

Red wasn't worried. In the first place, he was physically one of the strongest Martians, and in the second place, he said if he died, he just died, and one would later be born to replace him.

(That was something we hadn't figured out and they couldn't explain—after fifty or sixty of them had died, about the same number became female and fertile, to give birth about a year later.)

So we went ahead with it, with some trepidation, as soon as Little Mars was up and running. We only took two Mar-

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tians on the first flight, Red and Green, and six humans, Oz and Joan and me and a married pair of xenologists, Meryl Sokolow and "Moonboy" Levitus, and Dargo Solingen, I supposed for ballast. A lot of the mass going up was Martian food plus cuttings, seeds, and such, for getting crops established in their new home.

Paul was going to take us up to the new ship, the *Tsiolkovski,* waiting in orbit, and help transfer us and the luggage. Then he would take the *John Carter* back to the colony, and Jagrudi Pakrash would be our pilot for the seven-month trip back. She was pleasant and no doubt expert, but I did want my own personal pilot, with all his useful accessories.

My good-bye to Paul was a physical and emotional trial for both of us. The sex didn't work, no surprise, and there wasn't much to talk about that we hadn't gone over. Over and over. There was no getting around the fact that the radiation exposure limit kept him from ever coming to Earth again, and it would be many years before I could ever return to Mars. If ever.

Fortunately, we'd timed our tryst so I would leave early enough for him to get eight hours of sleep. I doubt that I got two. I stayed up late with my parents and Card, reminiscing about Earth.

It was hardest on Mother. We'd drawn ever closer since First Contact, when she seemed to be the only one who believed me. She was my protector and mentor, and in many ways my best friend.

Aristotle said that was a single soul dwelling in two bodies. But in physical fact we were one body, my part separated at birth.

It was not good-bye forever, or at least we were determined to maintain that illusion. I would be rotated back to Mars; she and any or all of them might eventually be assigned to Little Mars; we might all be allowed to go back to Earth, if contact with Martians proved to be safe.

That was a big "if." How many years of uneventful coexistence would be enough? If I were living on Earth, I might suggest a few hundred. Just to be on the safe side.

As it turned out, the launch was easier on the Martians than the humans. Oz, Joan, Marly, and Moonboy had been on Mars for eight or ten ares, Dargo for twelve, and they nearly suffocated under 3.5 gees; I had some trouble myself. Red and Green said it was like carrying a heavy load, but both of them routinely carried more than their own weight, tending crops.

Red enjoyed it immensely, in fact, the experience of space travel. He was budded in 1922 and had watched the human space program from its infancy to its current adolescence. He knew more about it than I did.

He and a couple of dozen others were especially well prepared for dealing with humans. Ever since the Mars colony's planning stages, they'd known that contact was inevitable. Out of a natural sense of caution, they wanted to put it off for as long as possible, but they would come to that meeting well prepared. Even the charade of not being able to speak human languages had been rehearsed since before my father was born.

My accident moved the timetable up, but not by all that much. Our satellite radar had shown the presence of water in their location, so eventually it would have been explored.

Another thing the accident did was turn a human into a relative of a Martian. They have a thing called *beghnim,* or at least that's a rough transliteration. It's a relationship, but also the word for a person—I was Red's *beghnim* because he had saved my life, which gave him a responsibility for my future. He said there used to be a similar custom among humans in old Japan.

On the way to Little Mars, we spent a lot of time talking with Red and

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Green—the others more than me, since I was finishing up my last year at Maryland. In fact, I was in a kind of nonstop study mode; when I wasn't doing schoolwork I was going over the notes that the others made from their conversations with the Martians.

It was challenging but tiring, my schedule more regimented than it had ever been under Dargo's ministrations on Mars. Besides the schoolwork and colloquy with Red and Green, I kept in contact with Paul and my family. Paul was understanding and timed his calls around my schedule. As the time lag increased, our romantic conversations took on a surreal aspect. He would say something endearing and I would reply, then click open a textbook and study plant physiology for seven and a half minutes, then listen to his response and reply again, and go back to adenosine triphosphate decomposition for another seven and a half minutes—and of course he was doing something similar on his side. Not the most passionate situation.

There was also two hours of exercise a day, in one of the two one-gee extensions. One side rowing, one side cycling, both plus the resistance machine. It wasn't too unpleasant; my only time for light reading or casual VR. I think we all looked forward to the two hours' guaranteed alone time.

The seven months' transit went by pretty fast, a lot faster to me than going to Mars, four years before. (Two and a fraction ares. We decided to switch to Earth units at the halfway point.) I guess subjective distance is usually that way: when you take a trip to a new place, it feels longer than the return will seem. And we had plenty to occupy ourselves with.

I met twice a week, Monday and Thursday, in VR with the Mars Project Corporation Board of Trustees. That was pretty excruciating at first, with the time lag. When the lag was several minutes, it was less a conversation than an exchange of set speeches. Each of the four or five—there were twenty-four on the Board, but everybody didn't attend the meetings—would have his or her say, and I would respond. It was anything but spontaneous, since most of them e-mailed me their text hours before the meeting, for which I was grateful.

Sometimes Dargo joined in, which didn't help.

Red couldn't take part directly; it would be years before we knew enough about the Martians' nervous system to attempt VR with them. So I'd normally go talk with him just before the meeting, even if there wasn't anything that directly needed his input.

I enjoyed talking with him, even in the dim fungoid chill of his quarters. (He said he didn't mind coming to my side, but he was much more expansive in his own environment.) In a curious way, he was more "human" to me than many of the board members and professors with whom I had regular contact, and even one of my fellow passengers.

More than an are before launch, we'd learned that Red was unique—in a sense, the only one of his family. He would live hundreds of ares, and when he died, another Red would be budded.

"I'm a Renaissance Martian," he said. "I'm supposed to know everything, be able to duplicate any other family's functions. The one who preceded me was the last who could actually do that. Contact with the human race, radio and television, made that impossible.

"Those like Fly-in-Amber remember everything, but they don't have to make sense of it. I do. Somewhere between Jack Benny and general relativity that became impossible." Jack Benny, I found out, was not a scientist.

He may have been obsolete, what with all that information overload, but he was still the logical one to go rescue the first alien they made contact with. He may not be the Renaissance Martian anymore, but he still was Einstein and Superman and the pope all rolled

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into one.

I asked him why, if the budding process could result in one individual like him every couple of centuries, why only one? Why didn't every Martian have his capabilities?

He said he didn't know: "That may be the one thing I *can* not know." He referred me to Gödel's Incompleteness Theorem, which of course made everything crystal clear.

Red and I had a lot of dramatic shared history, but there was another level of connectedness that was almost human, as if he were a favorite uncle. We were halfway to Earth before it dawned on me that on his side it was necessarily planned and artificial—he'd been studying the human race for more than a century before we met, and he knew how to act, to form a familylike bond with me. When I confronted him with that, he was both amused and a little upset: it was true, but he thought I'd been aware of that all along and was doing the same thing with him. There was also the *beghnim* factor, which of course could not have been planned.

He and Green also felt a degree of *beghnim* toward the other thirteen young humans they'd cured of the lung cysts, although it was philosophically complicated, since Martians were the source of the problem as well as its solution.

Our friendship grew over the seven months, perhaps in ways that the other humans couldn't share, although the four researchers spent more time with him than I did.

Dargo never warmed to either of the Martians, but she was hardly a ray of sunshine with the humans either.

I couldn't believe it when I found out that she was going along. Maybe there really is a God and he was getting back at me. The colony administrators were a more likely target for blame, though. Paul was sure she was just getting kicked upstairs, promoted to get her out of the way.

You could make a good case for her qualifications objectively. She had more years of experience in administration than anyone else off Earth, with the exception of Conrad Hilton IV, who was really just an ancient figurehead, living in orbit to keep his heart thumping while others tended the store.

But I couldn't really see how running the Mars "outpost," which she wouldn't call a colony, made her that qualified for administering our odd mix of humans and Martians. Who decided our small group needed some kind of hierarchal structure anyhow? A chief who wasn't really one of the Indians.

I supposed there had to be some third party, someone who was not involved with the actual work with the Martians, to evaluate proposals and be the naysayer. If we tried to work on every proposal the Corporation generously approved, there wouldn't be time to eat or sleep. The argument was that decisions had to be made by someone who was not herself a specialist, so she wouldn't give preferential treatment to xenoanatomy or linguistics or whatever. Martian cuisine. I could agree in principle, but as a practical matter, I would rather trust Oz or Joan—or even Moonboy, odd as he was—to make objective choices.

Anyhow, a lot of people were not sorry to see her go, and many of the same ones were just as glad that I was leaving on the same boat. A kind of poetic justice that she should be locked up in orbit with her troublemaker nemesis.

Our orbital elements had been manipulated so we would arrive at Little Mars on the Fourth of July, two cheers for the U.S.A. But it was convenient for me, because my last final exams were a month before that. So my life could be simplified for the last few weeks, before it became complicated in a different way.

In those last few weeks, Earth grew from a bright blue spark to a dot, to a button, and finally to the size of a classroom globe. We moved into the lander

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and strapped in, but matching orbits with Little Mars was agreeably gentle, almost boring.

We didn't know what boring was. We were about to find out.

2. Formalities

It wasn't just a matter of shaking hands with the president through a feelie glove. The president doesn't come up the Space Elevator without his staff filling up the rest of it. Then there were leaders of all the other seven countries and corporate entities who had built Little Mars, none of whom came up alone either, and the Corporation trustees, and another fifteen or so who had contributed to the Mars Project in some important way.

There were more people in orbit than at any other time in history. One hundred and fifteen were stuffed into the Earth side of Little Mars, and the Hilton was as crowded as a Bombay slum. Less interesting food, probably.

They all had to talk to us, and they all said the same things. After a while I could have used toothpicks to prop my eyes open, but settled for synthetic coffee and drugs. Red was very patient, though of course it was impossible to tell whether he was awake at any given time. That's an advantage to sleeping standing up and having eyes like a potato's.

The French delegation had a champagne reception that was pretty amusing, since there's no way you can open a bottle of champagne at our reduced air pressure without it spraying all over. They sent us a bottle, too, through the complicated biohazard airlock, and there was enough left after the initial fountain for us each to have a glass. The Martians use ethyl alcohol as a cleaning fluid, but it's toxic to them. Joan and Jagrudi don't drink, and Dargo declined, so we three had enough to get a little buzz.

Jag would be with us for six months, before piloting the next Mars shuttle, as it was now called. She was the first person to voluntarily enter the quarantine. She planned to do three and a half more round trips and then stay on Mars as a colonist, stuck by radiation limit as well as quarantine.

I was prematurely, or proactively, jealous of her, an unbeatable rival for Paul's affections. In the short time they'd been together in Mars orbit, they had been all business, but I suspected that would evolve into monkey business. She was pretty and well built—her figure reminded me of the idealized women on the erotic Indian frieze that Paul had shown me—and she was closer to Paul's age and would share his radiation-forced isolation.

The ceremonial silliness faded after about a week, and we settled down to business.

There were fifty-eight scientists and other investigators living in the Earth side, and after discussing it with Red and Green, we set up a simple schedule: they were both independently available for interview for two hours in the morning and two hours in the afternoon. I would be there with Red all the time, and Meryl (who was fluent in French) with Green. We let the Earth side people haggle among themselves as to how to split up those eight hours. If they wanted to be democratic, that was close to an hour a week apiece, even with every tenth day a holiday.

(Half of my tenth-day "holiday" was a trial, hooked up to a robot doctor who took obscene liberties with my body, though I was allowed to sleep through the worst, the brachioscopy. My reward for being the only one around who'd survived the lung cysts.)

The interviews went both ways, the Martians studying the humans as intensely as the humans were the Martians. It made the situation more interesting, more dynamic, as a question asked to a Martian could provoke an analogous question from the Martian, and vice versa. Hundreds of researchers

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on Earth were monitoring the whole exchange, of course, and sometimes their suggestions filtered up.

Red and Green worked hard. When they weren't dealing with the researchers on the other side of the glass, they had to deal with us, who could not only ask them questions but literally prod them for answers. Oz and Moonboy were trying to understand their anatomy and physiology; they also monitored us humans for signs of Dutch Elm disease.

Three of the people who would be going on to Mars with Jag came up early—Franz De Haven and Terry and Joan Magson. Terry and Joan were new to xenology. Coming out of successful careers in archeology and architecture, they had gotten permission to live in and study the Martian city. Franz was an expert on human immune response; he was going to Mars to study the human population.

It was interesting to have our own population almost double. Terry and Joan were an old married couple, Terry the famous one. Their status as a prominent lesbian pair might have helped their chances in the "lottery"—or maybe not; they weren't going to have any children without careful planning.

Franz was a darkly handsome man in his mid twenties. Jag was obviously interested in him, which stimulated in me a kind of primal jealousy—she would have him for seven months on the ship; I should be allowed to get in a lick or two, so to speak, while I was fifty percent of the available female population.

I mentioned that jokingly to Paul in my morning e-mail, and he responded with unexpected force: I should definitely do it while I had the chance; he never expected me to be a nun for five years, or seven or ten or forever. He even quoted Herrick to me, the romantic old areologist. Okay, I would gather my rosebud.

Men are not very mysterious when it comes to sex. A touch, a raised eyebrow, and there we were, wrestling in his cabin.

He was actually better at it than Paul, but that was just technique and maybe size. But I suppose it's better to have a clumsy man you love than an expert acquaintance. Or maybe I felt a little guilt in spite of Paul having giving permission. I didn't mention it in my letters until Franz was safely gone.

I was only getting half my rosebud's pollen, anyhow. Jag was kind enough to share.

I did talk about it with Red, who straightaway asked whether I was having sex with the new male. Was it that obvious, even to a centenarian potatohead? He pointed out that he'd seen thousands of movies and cubes, and the young girl falling for the dark stranger passing through town was a pretty common pattern.

Trying to be objective, I explained the difference between this and my relationship with Paul, and of course that was familiar to him as well, sometimes in the same movies and cubes.

He admitted to being jealous of humans for having that level of complexity in their daily lives. He had been fertile four times and successfully budded in three of them, but there were dozens of other individuals involved in the buddings, and no one of them had a relationship like lover or father of the bud. "Gather ye rosebuds while ye may" was an obscure joke to him.

Their reproduction did involve a combination of genetic materials, but it was sort of like a shower, or a fish swimming through milt. Six or more of them would engage in something that looked kind of like four-armed arm wrestling, and after all of them were exhausted, the one who had tested out strongest would become nominally female, and the others would sort of roll around with her, covering her with sweat-like secretions that contained genetic code. The female would grow up to four buds, all but one of which would die and be

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resorbed.

It was weird enough. In terran terms, Red was definitely an alpha male, a big strong natural leader—which meant that he was often pregnant.

Terry and Joan were a lot of fun to talk with. I was used to the company of the colony's scientists and engineers, so it was a novelty to exchange ideas with an architect and an archeologist. They picked my brains for everything I could recall about the Martian city—their research had been exhaustive, but we were the first people they'd met who had actually been there.

They'd been together fifteen years. Joan, the famous architect, was forty five and Terry was thirty five, so they'd been about the same age as Paul and me when they'd started out. It was Terry who'd had the lifelong interest in xenology and Mars; when we "discovered" the Martians, they'd both bent their considerable energies toward qualifying for a ticket.

When I sent Dad a picture of them he said they were a real "Mutt and Jeff" couple, I guess from some old movie about homosexuals. Joan was short and dark; Terry was taller than me and blond. They bickered all the time, but it was obviously affectionate.

Selfishly, I was glad to have some rich and famous people on our side of the quarantine. That much more pressure to lower it when we came to the five-year or ten-year mark.

The three of us talked with Red a few times. Terry was fascinated and frustrated by their lack of actual history.

"There've been preliterate societies who didn't have a sense of history going back very far," she said after one such meeting. "People might memorize their genealogies, and they might have traditions about which tribes were friend or foe, but without writing, after a few generations memory merges into myth and legend. Like the Martians. But according to Red, they've been reading and writing for thousands of ares."

"No conflict, no history," Joan said. "Nobody owns anything or anybody. One generation is just like the previous one, so why bother keeping track of anything? At least until our radios started talking to them."

"They do record some things," I said. "Fly-in-Amber knew exactly when a meteorite had hit, over four thousand ares ago. But I asked him how many had died, and he just said new ones were born."

"If they were human, I'd say they were in a culture-wide state of denial about death," Terry said. "They obviously have individual personalities, individual identity, but they act as if there's no difference between existing and not existing. Even Red."

"But they know how *we* feel about death. Red could have left me to die when I had that accident. And they didn't have to volunteer to help our young people with the lung cysts."

We were talking in the galley. Dargo had come in to get a drink and listened silently for a minute.

"You're too anthropomorphic with them," she said. "I wouldn't be quick to assign them human motivation."

"You do have to wonder," Joan said. "Where would their altruism come from? In humans and some animals there's survival value in regarding the safety of the group over the individual's—but they don't have any natural enemies to band together against."

"Maybe they did have, in their prehistory," Terry said. "Their home planet might be full of predators."

"For which they would be ill prepared," said Dargo. "No natural armor, delicate hands with no claws."

"Unimpressive teeth, too," I said. "Something like humans." Dargo gave me a weary look.

"Both Red and Green are adamant, insisting they didn't evolve," Joan said. "That the Others created them ab initio."

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"A lot of Americans still believe that of the human race," I said. "With only one Other, a lot more recent than the Martians' master race."

It was interesting that otherwise the Martians didn't have anything like religion. Some of them studied human religions with intense curiosity, but so far none had expressed a desire to convert.

From my own skepticism I could see why religion would face an uphill battle trying to win converts among Martians. They were a race with no other races to fear, no concept of wealth or even ownership, no real family, and sex as impersonal as a trip down to the gene shop. Which of the Ten Commandments could they break?

And yet they seemed so weirdly human in so many ways. That was partly our seeing them through a human-colored filter, interpreting their actions and statements in anthropomorphic ways—give the devil her due—a fallacy long familiar to students of anthropology and animal behavior.

But we actually had changed them profoundly, if indirectly, in a human direction, over the past couple of hundred years. Red didn't think there were any Martians left alive who could remember life before the radio machines started talking. And although at first they couldn't understand the noises coming from them, individuals like Fly-in-Amber recorded them all. The noises were obviously important, and resembled speech.

There wasn't a single Rosetta Stone for understanding human language, but two things combined to make it possible. One was television, which allowed them to connect words with objects, and the other was SETI, the twentieth-century Search for Extraterrestrial Intelligence, where scientists tried to communicate with aliens via binary-coded radio signals that started with simple arithmetic and moved up through mathematics, physics, and astronomy, and finally into biology, and human affairs.

The translation was easier for the Martians than it would be for someone farther away—they not only got the messages, but they could watch TV programs explaining about the messages in English.

We talked with Red about that. Maybe the Others had been listening to us, too, but if they were far away they'd be years behind the Martians in understanding us. He didn't think so, and gave a reasonable relativistic argument—if they were light-years away, traveling close to the speed of light, then as they approached the solar system, the information would pile up in an increasingly concentrated way, and of course by the time they got here, they'd be totally caught up. Assuming they were infinitely smart.

It turned out otherwise.

3. Speaking in tongues

When Jagrudi took my rosebud Franz off to Mars, along with Terry and Joan and another twenty-three, she was also carrying a cargo of special interest to Paul, an experimental drug called Primo-L. If it worked, it could revolutionize space travel, as well as other aspects of modern life: it was an antidote to radiation poisoning, at least from the low-dose, long-term kind of exposure that grounded space pilots and killed people who lived too close to places like the ruins of Kolkata.

They wouldn't let him just take it, since there would be years of human trials before it could be approved. He volunteered to be one of the "lab rats," but they turned him down, since he wouldn't be taking it under clinically controlled conditions. They'd only sent it along in case an emergency arose that required him to drive the shuttle, if the other two pilots were unavailable.

It happened. A few months later, in November, Jagrudi was out on the surface, working on the *Tsiolkovski* prior to launch, and a piece flew off a power tool and ripped open her helmet. They

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got an emergency patch on it and had her down in the clinic in a few minutes, but she had pulmonary embolisms and both her eyes were damaged. She might be all right in a couple of months, but that was way past the launch window. The third pilot was in the *Schiaparelli*, four months out, so Paul got the job.

It was a course of ten shots over two weeks, and he admitted they caused a little nausea and dizziness, but said it went away after the tenth, so he took off with his payload of three Martians and a bunch of stuff from their city.

Scientists couldn't wait to get their hands on the Martian hovercraft and the communication sphere that had connected them to Earth. But those engineering marvels paled in significance compared to something the Martians didn't even know they were bringing.

The engineering team came up three weeks before rendezvous, two of them joining us on the Mars side—a married couple who would eventually emigrate to Mars—and seven who joined the permanent party on Earth side.

Our couple, Elias and Fiona Goldstein, were practically bouncing off the walls with infectious enthusiasm. Only a little older than me, they both had fresh doctorates in mechanical engineering and systems theory, tailored for this mysterious job—analyzing self-repairing machines that had worked for centuries or millennia with no obvious source of power. Would they even work this far from Mars? If they didn't, Elias and Fiona were prepared to continue their investigations in the field, which is to say the Martians' city.

They'd brought miniature tennis rackets and rubber balls with them, and we improvised a kind of anarchic racketball game up in Exercise A, scheduling it while no one was on the machines. It was great to work up a sweat *doing* something, rather than sitting there in VR, pedaling or rowing.

Of course, my own favorite way of working up a sweat was only weeks away and never far from my thoughts.

Planning for our reunion was fun. I had seven months and quite a bit of money, with a good salary and no living expenses.

Shipping nonessential goods on the Space Elevator came to about two hundred dollars per kilogram, and I tried to spend it wisely. I ordered fine sheets and pillows from Egypt, caviar from the Persian coalition, and wine from France. I could have bought it directly from the Hilton, but found that I could have more and better wine if I managed it myself. I wound up buying a mixed case of vintage Bordeaux, of which I took half, the other six bottles going to Oz and Joan, who in turn sold two to Meryl and Moonboy.

As the *Tsiolkovski* approached, there of course was less and less time delay, messaging, and Paul and I were able to converse almost in real time. We coordinated our schedules and made half-hour "dates" every day, just chatting, catching up on each other's lives over the past two years. I have to admit that his obvious eagerness to talk was a relief. A lot could happen during two years, but a lot more could happen to *him*—one of the few single young men on the planet.

He had admitted to a fling with Jag, which was about as surprising as gravity. But it didn't really work, partly because she was having reservations about living on Mars, which was rather less exciting than her native Seattle. If the quarantine was lifted before radiation kept her out of space, she probably would exercise her option to go back to the ground, the next time she returned to Earth orbit.

Paul was committed to Mars; it had been his planet since he signed up eight years ago. To him, the place where I lived was a suburb of Mars, though it happened to orbit another planet. That was my own attitude, though in my case it was more resignation than affirmation.

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I knew I wouldn't be able to just drag him off the ship and down to my room—but the look he gave me when he stepped out of the airlock said that was on his mind, too. But he had to supervise the unloading and disposition of his cargo, which took two hours, with Dargo breathing down his neck. Then say hello to Red and Green and get Fly-in-Amber and Sunrise established in the Martian quarters, and meet the new members of the Mars-side human team.

Dargo offered to introduce him to the people on Earth side, but he pled fatigue and let me guide him by the elbow on a tour of Mars side, which got as far as my room.

He didn't show any sign of fatigue over the next half hour, though at first he sweetly suppressed his own urgency to attend to mine. I did have the impression that it had been all carefully rehearsed in his mind, but what else was he going to do for seven months, locked up with a couple of Martians?

It was much better for me, for whatever reasons, than aboard the *John Carter* or in his shared room in the colony. My own territory, I guess, with my own lock on the door. Egyptian sheets and pillowcases didn't hurt.

The wine bottles had corks made of actual cork, which I should have foreseen. I quickly dressed and slipped down to the galley unobserved—almost everybody being over in the Martian environment with the new arrivals—and got a thin-bladed knife that served the purpose.

We had time for a half a glass of wine each and a shared cracker heaped with caviar. Sitting on the bed just looking at one another with goofy expressions, and the phone squawked.

It was the loud, penetrating emergency signal. I got it untangled from my pile of clothes and punched NO VISION.

Dargo's face, pale. "One of the new Martians is having some kind of seizure, in Mars side B. You'd better get over here. Bring Collins . . . if you can find him," she added with no inflection.

We dressed hurriedly. "Were either of them sick on the way over?"

He shook his head. "Who's ever seen one sick? How could you tell?"

Mars side B was a conference room with Martian-city normal temperature and humidity, a little cold and dry for comfort. The wall was a three-dimensional representation of the Martians' city from above, as seen from the curving ramp that led to the surface. The floor was a soft incongruous gray Astroturf, chosen by Red.

Four humans and two Martians were bunched around Fly-in-Amber, who was lying on the floor, twitching. It was an unnatural sight, even for people used to seeing Martians, since they didn't lie down to rest. I remembered seeing a picture of a cow that some pranksters had tipped over on its side; he looked as odd as that.

"How did he get like that?" I asked Red.

"I've never seen it before, except as a joke." He was sort of kneeling, bending one of Fly-in-Amber's legs. "It looked as if his two legs suddenly collapsed, and the other pair, at the same time, pushed hard, as if jumping." He said something in Martian, loudly, but Fly-in-Amber didn't respond.

"It isn't some kind of odd joke?" Oz asked. "A practical joke?"

"I don't think so. It's childish. Fly-in-Amber is too stiff for that. Dignified." Red faced Paul. "Did he act strangely during the crossing?"

"Forgive me, Red," Paul said, "but to me you all act strange, all the time."

He made his little buzz sound. "You should talk, Two-legs. I mean, did his behavior or conversation suddenly change?"

"He talked a lot more during the last couple of days, approaching Earth. But we were all excited, ready to get off the ship."

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"Of course. You were eager to mate with Carmen. Did that happen yet?"

I had to smile. "It was fine, Red."

"That's good. Green has gone to Mars C, to send a message to the other healers at home. She'd never seen this either."

"Nor have I," said Sunrise, who was the same saffron color as Fly-in-Amber. "And I don't forget."

Red swiveled to regard him. "This is not something I would forget, either."

"Should we pull him back upright?" I asked.

"Not yet," Red and Sunrise said at the same time. "Wait until we hear from—"

Fly-in-Amber started talking, a quiet uninflected warble. Sunrise moved close to listen.

"Is this being recorded?" Paul said.

"Of course," Dargo Solingen snapped.

Red gestured at Sunrise. "Not really necessary. He'll have it all."

"What is he saying?" I asked.

"It sounds like nonsense to me." Red shook his head, ponderously, a gesture that he'd learned to copy from us. "Perhaps code? I've never heard anything like it."

"I have," Sunrise said. "Not me directly, but one of the first rememberers."

"Do you know—did he know what it was?" Oz said.

"No. Or if he did, that part is lost. It was a long time ago."

"Before the meteorite?" I asked. "Before 4,000 ares ago?"

"Oh, long before. Long, long. One of the first."

"Can you make any sense of it?"

"No, not yet. But it doesn't seem . . . it isn't random. He is saying something."

Fly-in-Amber stopped with a noise like a sneeze. Then a long monotone, like a sung sigh. Sunrise said something in Martian, and after a pause Fly-in-Amber answered a couple of halting syllables.

He started to rise but hesitated. Red and Sunrise helped him to his feet, Red chattering away. He answered, obviously faltering. Red made an odd fluting sound I didn't think I'd heard before. "Can you tell them in English?"

Fly-in-Amber stepped around to face us. "I don't know what happened. Red says I fell down and spoke nonsense while my body shook.

"To me, I was blind, but I felt the floor." He gingerly patted his right arms with his main left hand. "Along here, that was strange. And I smelled things that have no name. At least that I've never smelled. And I felt cold, colder than home. Colder than Mars, outside.

"But I don't remember talking. Red says I talked and talked. I heard something, but it didn't make any sense."

"Maybe you heard what you were saying to us?" Sunrise said.

"No, it wasn't words; nothing like words. It was like a machine sound, but it was like music, too, human music. A musical machine?"

Dargo played back part of it. "Doesn't sound very musical."

Fly-in-Amber tilted his head back, as if searching the ceiling and walls with potato eyes. "I mean something like 'feeling.' When you say music has feeling."

"You mean emotion?" Oz said.

"Not really. I understand that you humans have emotions when events or thoughts cause chemical changes in your blood. In your brains. We are similar, as you know. This is not . . . not that real?"

He swiveled toward me. "It's like when Carmen tried to tell me, at 20:17 last Sagan 20th, how she felt while reading the score of Beethoven's *Eroica* symphony. That seeing the dots on the screen made your brain remember the sound, and the feeling that the sound caused, even though you weren't hearing anything. Do you remember that?"

"I guess." If you say so, Dr. Memory.

"It was that kind of, what would you say, distance? What you said about reading the score was that it was like a diagram of an emotion, an emotional state,

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but one you didn't have a word for."

I did remember. "That's right. You can call it 'joy' or 'hope' or something, but nothing really precise."

"So if someone couldn't read music and didn't know anything about how music is written down, still, they might see the score and recognize patterns, symmetries, as having beauty, or at least significance, without connecting them to sound at all."

"I've seen something like that," Oz said. "A system of notation that dancers use to record a performance. There's no way you could tell what it was without knowing. But there was symmetry and motion in it. I guess you could say it had intrinsic beauty."

"Lebanotation," Red said. "I saw it on the cube."

Green had come back and listened silently for a minute. She let out a burst of rapid-fire French and then paused. "Fascinating. Save it for later. Fly-in-Amber is ill. I must take him away and look at him."

Red said something in Martian and she answered with a short noise that I recognized as affirmation. She put a pair of arms around her patient and led him off to their living quarters.

Red watched her go and made a human shrug. "She is the doctor, in a way. But I doubt that there is any treatment for this."

"She talked to Mars," I said, and checked my watch tattoo. "She might have heard by—" She came rushing immediately back, warbling and rasping at Red.

"She says the same thing has happened on Mars, evidently at the same time. Most of the memory family fell down and started talking this nonsense."

"It was *temps du Mars* 09:19 when it happened there. Seventeen Earth minutes after Fly-in-Amber."

"As if they caught it from him," I said.

"Or it came from Earth," Paul said.

"Or outer space" Red gestured down the hall. "Anywhere out there."

4. Puzzles

The memory family had seventy eight members, less than one percent of the total Martian population. They were oddballs, but curiously uniform in their eccentricity. In human terms, they were vain, scolding, obsessive, and humorless. The other Martians enjoyed a whole class of jokes about them and didn't take them too seriously, since history was not a traditionally useful pursuit. And then this odd thing happened.

In less than an hour, it became obvious that "odd" only began to describe it.

The people in New Mars would have decoded it soon, but they were beaten to the punch by a Chilean researcher, who idly fed a recording of the data through a reverse SETI algorithm—a program that looked for patterns like the ones we had been sending out for more than a century, trying to contact intelligent life elsewhere in the universe.

The dot-and-dash digital message was slightly obscured because it was mixed into a far more complex one, like a radio signal that carried both amplitude and frequency modulation. Filtering out the frequency modulation gave an unambiguous pattern of dots and dashes. There were 551 of them, and the same pattern was repeated ten times.

The number 551 is interesting because it's the product of two prime numbers, 19 and 29. One of the most basic SETI maneuvers was to make up a message with (in this case) 551 ones and zeros, which you could transmit with dots and dashes, then represent them in a crossword-puzzle-style matrix, either 19 squares by 29 or 29 by 19, making a picture out of the black and white squares.

The signal went like this:

```
11110000111010110011001000010
00010101100100000100101001111110
00000101010001000000001110101000
11000000000000000000000000000000
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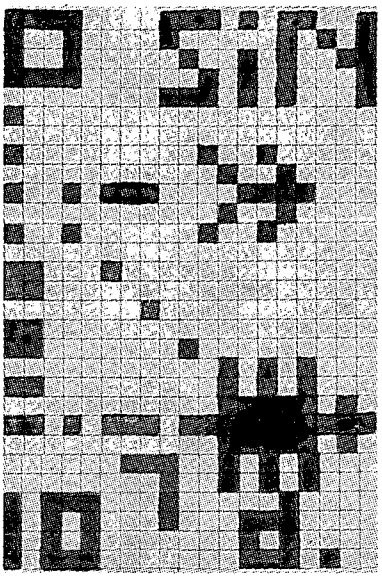
0000000100000000010010000000000
0000010010000100101110000111000
0000000000010010000100100000100
1000000000000000000000000100010
0000000000001100000000000000000
0000010000000000011000000000000
0000011000000010000000000000000
0001010100011000000001010100000
0000000001111101011010111011111
1111000000000001111101000000111
0010101000000000001001010100101
1100010000010000101010001000111
0001010100000001010000101110000
001110100

The first time the Chilean astronomer tried, he used the 19 by 29 matrix, and got nothing coherent. The 29 by 19 gave this interesting picture:



Humans and Martians gathered together in front of the monitor as the Chilean's drawing came in.

"In *English?*" Oz said. "What the hell is 'O Sin'?"

"I think it's some kind of human joke," Sunrise said. "They said it was 551 ones and zeros?"

"Correct," Dargo said.

"Unless it's a coincidence, unlikely, then it's a joke reference to the first example of trying to communicate this way. Frank Drake made it up in 1961, and it was widely broadcast. The O in the upper left corner would be the Sun, with the Solar System underneath it: four little planets, including yours and ours, then two big ones, and then two medium sized."

"So what about sin?" Oz said.

"I don't know," Sunrise said. "I don't really understand human jokes. That corner of Drake's picture was a symbolic representation of the atoms of carbon and oxygen. Necessary for life."

"Silicon and nitrogen," Paul said. "Si and N. They're a silicon-based life-form?"

"With six legs," Oz said, "or eight, two of them small. There's a square next to the Earth, with a line pointing to a man-shaped diagram. Another square next to Mars, and one over Neptune, with lines toward the diagram of an eight-legged creature."

"We don't look like that," Sunrise said. "We don't have eight legs."

"We have eight appendages." Red tapped the screen. "There is a solid line from Neptune to the creature, but only a dotted line from Mars to it. That might mean something."

"But hold it," Oz said. "Nothing could live on Neptune. Eight legs or nine or whatever. It's a cryogenic hell."

"No." Red shook his huge head. "Ha, ha. I mean, yes, humans and Martians would freeze solid there in a matter of seconds. But there could be something like organic chemistry with silicon and nitrogen—liquid nitrogen being a solute, like water in our chemistry. You could have compounds analogous to amino acids and proteins. So complex life chemistry could be theoretically possible."

"There's hardly any free nitrogen on Neptune," Paul said. "Hydrogen, helium, a little methane for color."

"Not Neptune itself." Red drummed the fingers of his small hands together.

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"Its largest moon, Triton."

Paul nodded slowly. "Yeah. Geysers of liquid nitrogen when it's warm enough."

"We don't know much about it, do we?" Oz said.

"Haven't been there since forever," Paul said. "A flyby in the nineteen-eighties?"

"In 1989," Red said. "The Chinese-Japanese Outer Planets Initiative was launched in 2027 but went silent when it arrived in 2044. But there's been a lot of study from various hubbles. There are probably a hundred specialists about to start bouncing off the walls."

"What about the number down in the corner?" I said.

"Ten to the seventh," Paul said; "ten million. And that looks like a 'd' after it. Ten million days?"

Red and Snowbird translated it simultaneously. "27,378 years." Snowbird added, "14,970 ares, in Martian sols."

"I wonder if that's how long you've been on Mars," I said. Red shrugged.

"It's how long human beings have been all human," Oz said, "in a manner of speaking. Interesting coincidence. The last Neanderthals died about 27,000 years ago. I guess *Homo sapiens* has been the dominant species ever since."

"Having killed off the Neanderthals?" Moonboy said.

Red gave his slightly maddening monotone laugh. "Ha ha. Nobody knows what became of them."

"Homo sapiens invited them over for lunch," Moonboy said, "and they turned out to be the main course." Dargo shot him a look.

Oz tapped the eight-legged figure. "These could be your Others. Who created you in their image, more or less."

"Living that close." Red shook his head. "And on so small a world? Triton isn't even as big as your Moon."

"They might be like you," I said. "You don't take up a lot of real estate."

There was a double-ping signal and a familiar face appeared, superimposed over the Drake diagram. Ishan Jhangiani, Science Coordinator on the Earth side. "This is interesting. Some of the Martians were watching the broadcast, but only the yellow ones were affected. And the nine yellow ones who were doing something else were not affected.

"I don't think we have any organs that discriminate between regular light and coherent light," Red said. "So how could that work?"

Ishan chewed his lip and nodded. "Well, just pursuing logic . . . you would never encounter such a strong burst of coherent light in the normal course of things. So you, or rather the yellow ones, could have such an organ and never know it."

"But it wouldn't have any useful function," Oz said.

"Ha ha. But it would. It would make you fall down and speak in tongues whenever somebody on Neptune, or Triton, wanted you to."

That would turn out to be pretty accurate.

5. Unveiled threat

After the excitement died down, most of us went back to the mess and zapped up a meal. Dargo went off somewhere to stick pins in dolls.

I traded the lump of rice in my chicken for the pile of mashed potatoes that came with Oz's meat loaf. He exercises as much as I do, as we all do, but he keeps putting on weight, while I lose it.

"I don't get it," Moonboy said. "If they wanted to send a dot-and-dash message, why be so roundabout? Why not just use the ruby laser itself?"

"For some reason they wanted the Martians involved," I said. "One Martian, at least. What I want to know is how Fly-in-Amber got all that information out of the red light." So far, all we'd gotten was on/off, on/off.

Oz nodded. "And what's different about Fly-in-Amber and those other yellow ones, that they were the only Martians affected by it? The anatomical

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scans we did on Mars didn't show any significant differences between the various families, except for Red. With all his extra brain and nervous system mass and complexity, I'd expect him to be the one singled out, if any."

"He said he didn't feel anything special," Meryl said. "But he only looked at it for a couple of seconds. Then he was worrying after Fly-in-Amber."

"I'll do a high-resolution PET scan of all their eyes and brains," Oz said. "See whether Fly-in-Amber has some anomaly."

There was a pause and Paul shook his head. "Triton? How could intelligent life evolve on Triton? How could anything complex?"

Oz studied his meat loaf for clues. "Well, it couldn't be like Earth. A large variety of species competing for ecological niches. At least intuitively that doesn't sound likely. If it's like Red suggested, a quasi-organic chemistry based on silicon and liquid nitrogen, think of how slow chemical reactions would be."

"And how little chemical variety," Moonboy said, "with so little solar energy pumping it."

"There's also energy from radioactivity," Paul pointed out, "and tidal friction from Neptune. I think that's what causes the liquid nitrogen geysers they see."

Moonboy persisted. "But it would never have anything like the variety and energy in the Earth's primordial soup."

"You're all barking up the wrong tree," I said. "If the signal really is coming from the Others, they didn't evolve on Triton. The Martians' tradition is that they live light-years away. So this laser thing could just be an automated device. It isn't any more or less impossible than the Martian city. That was supposedly built by the Others, a zillion years ago."

"Or 27,000," Oz said. "You're right. But why did it start blinking exactly as soon as one of the yellow family reached Earth orbit? That would be some sophisticated automation."

That gave me a little chill. "In other words . . . we're being watched?"

He stroked his beard. "Give me another explanation."

Over the next several days, scientists on Earth as well as here analyzed the signal from Neptune, which had stopped eight hours and twenty minutes after Fly-in-Amber's condition had been broadcast to Earth. That was exactly twice the travel time of that broadcast to Neptune, which fact was an interesting piece of information in itself. Mission accomplished; turn it off.

The laser beam was apparently just that, a simple powerful beam of unmodulated coherent light, carrying no information other than the intriguing fact of its own existence.

There are some natural sources of cosmic radiation that produce coherent light, but nobody was pursuing that direction, since the timing of it would be an impossible coincidence. It was artificial, and in its way was as much a message as the Drake diagram that came out of the amplitude-modulation part of Fly-in-Amber's utterances. The amount of power it was pumping was part of the message, a scary part.

It could destroy an approaching space ship. Maybe it had, once.

The frequency-modulation part of the message resisted analysis. Each of the ten iterations of the signal had different and apparently random patterns. The Martians here and on Mars listened to them and agreed that they sounded like Martian speech, albeit in monotone, but made absolutely no sense. Fly-in-Amber found it quite maddening. He said, "It sounds like a human idiot going 'la la la la' over and over." Well, maybe. But sometimes the "la" became "la-a-a" or just "ll," and sometimes it sounded like a pencil sharpener trying to say "la."

Four or five days after the excitement, I was dragging my weary bones home after exercise and was surprised to meet Red at the end of the corridor. The Mar-

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tians didn't often wander over this way.

"Carmen. We always meet at my place. Could I have a look at yours?"

"Sure, why not?" It was a mess, but I doubted that Red would care. He'd learn more.

I thumbed the lock. "I normally take a shower after working out."

"Your smell is not toxic." I guess you take your compliments where you can find them.

He looked large in my small room, and strange, hemmed in by undersized furniture he couldn't use. He wheeled the desk chair over in front of him.

"Could we have some music? Bach Concerto Number 1 in F Major?"

"Brandenburg, sure." Pretty loud. I asked the machine and it started.

"A little louder?" He gestured for me to sit in front of him. I did and he leaned forward and spoke in a barely audible whisper.

"Everything I do in my quarters is recorded for science. But this must be a secret between you and me. No other humans, no other Martians."

"All right. I promise."

"When I listened to the frequency modulation part, I understood it immediately. Only I could understand it."

"Only you . . . it was in your private language? The leader language?"

He nodded. "Perhaps it is the real reason we have to learn the language. Because this was going to happen eventually."

His voice became even lower, and I strained to hear. "It told me that we Martians are biological machines, developed for this purpose: to communicate with humans if and when they developed to this point, a time when flight to the stars became possible."

"I thought it wasn't yet."

"Within a few human life spans. The Others work slowly."

"You mean the Others actually did evolve on Triton?"

"Not at all, no. They do come from a planet revolving around another star, some twenty light-years from here. It's a cold planet, ancient, and its cryogenic kind of life has been there for literally billions of years.

"The one individual on Triton was especially engineered for its task, as were all of us Martians. We're all here to keep an eye on you humans.

"The Others move very slowly; their metabolism is glacial. They *think* fast, faster than you and me, because their mental processes utilize superconductivity. But in physical manipulation of their environment . . . you would have to study one for hours to see that it had moved.

"The one on Triton moves about sixty four times as fast as they do; we move about four times as fast as it does. To match you.

"They offer this as an analogy. Suppose you humans, for some reason, had to communicate with a mayfly."

"That's a kind of insect?"

"Yes. Though it lives most of its life as a variety of nymph. When it becomes an actual insect, it only lives for a day. How would you go about communicating with it?"

"You couldn't. It wouldn't have anything like a brain or language."

Red grabbed his head and shook it. "Ha ha. But this is analogy, not science. Suppose it had a quick squeaky language, and intelligence, and civilization, but it lived so fast that the span from birth to death was only one day. How would you communicate with it?"

"I see what you're driving at. We're the mayflies."

He grabbed his head again. "You gave away the ending. But suppose you did have to communicate with these intelligent mayflies. To them, you are slow as Sequoias. How do you get them to realize that you are also an intelligent form of life?"

"Build a machine? One that moves as fast as they do?"

"Yes, but not in one step. What the Others did was build a machine, a car-

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bon-based biological one, that lived somewhat faster than they did—and which had the ability to build a machine faster than itself. And so on down the line."

"Until you had one that could talk to mayflies. Humans, in this case."

He nodded. "That's what we are. We Martians."

"Your only function is to communicate with us?

"I would say 'destiny' rather than function. We do have a life, a culture, independent of you. But humans are our reason for being."

"So why," I whispered, waving my hand at the music, "why all the secrecy?"

"Because I'm not supposed to be explaining this to you. To anybody."

"We're supposed to decode the message ourselves?"

"I don't think you could. I don't think even a Martian could, no matter how brilliant, unless he spent all his youth studying my language."

"Maybe not even then," I said. "Oz says your brain is immensely more complex than other Martians'. But why do the Others want to keep it secret?"

"I don't know the details yet. But they're afraid of you; of what you may become. Millions of years ago, they had trouble with a planet in a nearby system, somewhat like the Earth. Water-carbon-oxygen life. They're frightened by how fast you act. How fast you evolve."

"What kind of trouble did they have with this planet? A war?"

"I don't think that would be possible. I think it was what you would call a preemptive strike."

"So . . . they destroyed them?"

Red nodded slowly. "After the young planet started sending out interstellar probes. The Others' world was relatively near—their sun was maybe a hundred times the distance from here to Neptune—what we would call a wide double-star system—so of course the Others were their first interstellar destination."

"The young world was going to invade at that distance?"

"The Others didn't know. But there were wars on the oxygen planet, worldwide wars, for years before they had space travel, and the Others could observe them indirectly. As we, and they, have done with you."

"So the Others suddenly developed space travel themselves, and went off to do this 'preemptive strike'?"

"Oh, no. They'd been exploring other planets with probes for many thousands of years. They'd been to this solar system, and others, with complex autonomous robots to gather information, deliver it, and self-destruct."

His voice grew even lower. "As we have observed, they have considerable talent, power, for manipulating things at great distances. The tools for the preemptive strike were in place long before they decided they had to be used."

"My god. Are they in place here on Earth, too?"

"That wasn't clear. Sometimes the message was allusive, metaphorical . . . it was sort of 'if it's true, it's too late for the humans to do anything about it; if not, nothing needs to be done.'"

"We might feel differently. We humans."

"It also said that for the humans' sake, the threat ought to be kept secret. Not for its own protection, it emphasized. For *your* sake—I think so it wouldn't have to take action prematurely. Though my sense is the 'action' wouldn't be anything like an invasion or even a launched missile. It would be a small act, like turning on the laser beacon.

My heart was hammering. "Could it destroy the Earth just like that? So casually?"

"I doubt it. And it wouldn't want to, literally, destroy the Earth. It said that we could have the planet if you proved unsuitable. We Martians."

"Now that would go down really well on Earth."

"Don't worry. Who needs the gravity?

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The Others are aquatic, or whatever you call something that lives in liquid nitrogen. They don't think about gravity any more than fish do. They just float there."

I felt he was telling the truth. "You're on our side."

He nodded. "It can't see that. Even if I was not in *beghnim* with you, I would feel closer to you, to all humans, than to them. The Others may be our creators, but in terms of simple existence, we are much closer to you.

"They hardly live at all, on our time scale . . . and technically, they never die."

"Never? How do they manage that?"

"An individual will stop moving, stop metabolizing, for a thousand years or more. Dead except for the information structures that make up its individuality. When it's needed again, it's kind of . . . jump-started."

"I don't know that term."

"I was afraid you wouldn't. Basically, some other individual decides it's time and applies enough energy to get it metabolizing again. A process that might take ares.

"So in a sense, it's never really been dead. Though for a thousand ares or so, it's been no more alive than data stored in a machine."

"How many of them are out there, alive, at any given time?"

"It could be three or three trillion, I don't know. The only one we have to worry about is the speeded-up one on Triton. The others are thirty ares away from affecting us in response to anything we do. And it would take them ages to respond."

"If some people, a lot of people, knew what you've told me, they'd be declaring war on Triton. Which would do a lot of good, I know."

"A lot of expense for nothing. The best they could do would be to send a heavily armed and automated vessel out to find a small target beneath the surface of Triton and destroy it. But it's impossible."

"Not theoretically. Not if a majority wanted it badly enough."

"I meant practically. You realize how powerful that laser would be, close up?"

"Paul worked up some numbers. If it could be aimed and used like the American Star Wars lasers were supposed to, they would be able to vaporize any conventional space vehicle, long before it got to Triton."

"Ha ha." He nodded rapidly. "But think larger. Suppose this laser is far from being the pinnacle of their technology. Suppose they had one a thousand times more powerful. Suppose it was hidden on Earth's moon."

"It could do some real damage, even if they stopped it pretty quickly."

"It would be hard to stop, wouldn't it? And in less than one day it could destroy every city in the world and set fire to all the forests and plains. The smoke would persist long enough to stop agriculture."

"Did . . . did the Other threaten to do something like that?"

"No, not in so many words. It did imply that the destruction would only take one day, and from that I extrapolated various possibilities. But it was not like a threat or a prediction." He paused for several seconds. "It's hard to translate the exact intent. It was presented as a theoretical possibility, almost an entertainment for the Other. Like a horror movie that could come true.

"I think I know the leaders' written language well. But I've never heard anyone speak it. Doubtless there are nuances that I've missed."

"Only one day." We needed a scientist here. "I guess it could deflect a large enough asteroid to make a disaster like the dinosaur wipeout. Or release some kind of poison in the air. But wouldn't that take more than a day?"

"Unless it was released at thousands of places all at once. But the 'one day' was only an implication. It could just stand for a short period of time. Maybe a short time in comparison to how long it

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normally takes for a species to go extinct. As I say, it's hard to tell whether it's being direct or speaking in metaphor and symbol."

"Can you talk back to it?"

"I don't see why not, at least in terms of technology. *You* could probably talk to it. It seems to understand English. Just go on the 6:00 news and say 'Please, Mr. Other, don't destroy us in one day.' But that would sort of give away our secret."

"You could talk to it, though, in your secret language. I mean on the same news show. Without letting on that you'd talked to any human about what it said."

"I'll do something like that, eventually. But first I want to see how it reacts to the Drake diagram project. That should be ready in a day or so." The Earth-side scientists were arguing with a consortium on Earth—of course including the Chilean astronomer who'd "cracked the code," and was turning out to be a real pain in the ass—trying to agree on a 29 X 19 matrix message to send back to Triton via ruby laser.

"Maybe they should just send block letters. GOT YOUR MESSAGE. PLEASE DON'T KILL US."

6. Peace offering

In fact, they did a variation of that. The top five rows were taken up with the word PEACE in big block letters. Then there was a symbolic representation of an amino acid, alongside the same for some silicon-nitrogen molecule that might be a similar building block for its form of life, and then a question mark.

A second message was a star map, looking down on the galactic plane, with Sirius at the center. (It would probably be the brightest star in their sky, too, if they came from nearby). The Sun's position was identified with a cross. Then there was another question mark.

I wasn't too sure about that one—I mean, "We told you how peaceful we are. We'd never invade you. So why not tell us where you live?"

The morning they were going to send the message, I got up at 5:00 and found a message that Dargo wanted to see me at 8:00.

That couldn't be good news. Unable to concentrate on work, I surfed around the news and entertainment. I almost went to wake up Paul, but figured he was going to be busy with the message transmission, more ceremony than science. He was scheduled for three hours of VR interview after it, so he could use his sleep.

I was, too, which is why I couldn't sleep. Dargo was probably going to tell me what I could and could not say. Good luck with that.

I dawdled over coffee and hard biscuits. At five after eight, her door was open.

"Please close it behind you. Please have a seat." She was studying a clipboard and didn't look up.

The chair was hard and low. She kept reading for a minute and looked up suddenly. "You had a Martian in your room day before yesterday."

"So?"

"So what was he doing there?"

"Well, I guess you got me. We were having sex."

"Carmen . . ."

"It's pretty wonderful, with all those fingers. You should try it."

"Carmen! This is serious."

"I've been in his room a hundred times. He was curious about what mine looked like. So?"

She just glared at me. She pushed a button on the clipboard and it started playing the first Brandenberg Concerto.

"You . . . you were eavesdropping."

"You were committing treason. Against Earth. Against humanity."

"Talking with Red. I do that all the time."

"You've never whispered under music before."

I raised my eyebrows and didn't say

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anything.

"What were you two talking about?"

"You tell me. What does the recording say?"

She stared at me for a long seconds, her mouth set in an accusing line. I knew that tactic, but finally broke the silence. "You don't know what it says."

"I can't decipher much of it. But other people, specialists in sound spectroscopy, will be able to."

"So send it to them." I moved closer to her face. "And be prepared to explain how you got it."

"You can't threaten me. I have clear statements like this!" I heard my voice whisper ". . . got your message please don't kill us."

"You're pleading with the Others, aren't you? You can't negotiate on behalf of the whole human race!"

"You have it totally wrong." I stood up. "I have to talk to Red."

"You don't know what you're doing. He's not your *friend*. He's the enemy."

I paused at the door. "Do you have a favorite piece of music? Something loud?"

We only had about an hour before the Drake diagram thing, and of course Red would have to be there, too. I called and asked him to drop by my place on the way.

I found an ancient Louis Armstrong composition with the Hot Sevens, which gave us a pretty constant level of loud interference.

After I'd told him about the meeting with Dargo, he folded all four arms and thought for a minute.

"I see three courses of action, and inaction, with different degrees of danger," he whispered.

"The easiest would be to just do nothing and hope that Dargo lets sleeping cows lie."

"Dogs. Sleeping dogs."

"Ah. Then there is the extreme other end: assume that the Other is bluffing and just broadcast the truth. That would be almost equally simple, but if the Other *isn't* bluffing, it might be the end of the human race—and perhaps Martians as well."

"But it said Earth could be yours."

"It would have no more need for us, if the humans were gone. We don't know whether it can lie. Like a sleeping dog, ha ha.

"As a middle course, we might enlist a confederate or two, for insight and perspective. On the Martian side, it would have to be Fly-in-Amber. On the human side, the logical choice would be Dargo Solingen."

"Out of the question."

"This is not about personality, Carmen. I don't get along with Fly-in-Amber, either.

"Your great military philosopher Sun Tzu said to 'keep your friends close, and your enemies closer.' He had some experience with alien invasions."

"None that loll around in liquid nitrogen and zap you with killer lasers. What about Paul?"

"His engineering and science would be handy. But I suggested Dargo because she knows so much already. Making her an ally might buy her silence."

He made a gesture I'd never seen before, pushing down on his head with both large hands until it was almost level with the ground. Then he released it with a sigh. "It's a pity life is not a movie. In a movie we could just throw her out the airlock and go about our business."

"Making it look like an accident."

"Of course. But then the detective would figure us out and show up with handcuffs."

"Quite a few, in your case."

"Ha ha. There is an intermediate course. We appear to enlist Dargo's aid, but don't tell her everything."

"Lie to her."

"Perhaps a necessary evil." I suddenly wondered how much of what Red had told me was the truth.

"What would we keep from her?"

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"The threat itself? I take it she doesn't know that I can understand the message. We could tell her that much and then claim it was something less disturbing."

"No . . . she heard me say that we got the message, and 'please don't kill us'—she can extrapolate a lot from that."

Red nodded. "Merely mortal danger."

I tried to keep my voice down. "The only thing we have on her is the fact that she broke the law making that recording."

"There is also the fact that she apparently has little beyond that one phrase."

I thought back to what she'd said. "True. Little enough. She didn't seem to know that you had decoded the FM message. 'We got the message' could refer to the Drake diagram thing. As far as she knows, we were conspiring to communicate with the enemy in English."

He paused. "Until we learn differently, then, let's make that a working hypothesis: she thinks we don't have any more data than anyone else. Meanwhile, we enlist Fly-in-Amber and Paul, swearing them to absolute secrecy.

"When the Other responds to Earth's overtures, we'll decide on our own course of action."

"And if it doesn't respond? How long do we wait before we try to contact it ourselves?"

"If it moves at one-eighth my speed, I'd say a week. Of course, it might have various responses prepared ahead of time."

"Like destroying everything?"

"No. If it were that simple, there would have been no need for the message it sent to Fly-in-Amber. We're safe for the time being."

"Which could be hundreds or thousands of years."

"Yes. As long as we don't do anything that threatens it or the Others back home. Or it could be hours or days." It made its humanlike shrug.

My timer's buzz was barely audible over the festive jazz, Dixieland gone to Chicago a couple of centuries ago. "That's the ten-minute warning. Guess we better go up and watch them push the button."

Just about everybody, human and Martian, showed up for the ceremony. One wall of Earth A was a glass one shared by its counterpart on the other side of the quarantine. We had more room per person, or entity, but they had champagne.

After the short speeches and button pushing, the screen showed a roster for interviews at the two VR sites. Paul and I were scheduled first, though with two different interviewers. Paul had a guy from an MIT technical journal. I was stuck with Davie Lewitt, who was pretty and intense but not remarkably intelligent. She had interviewed me after the Great Hairball Orgy on Mars and pinned the name "The Mars Girl" on me. For a couple of years, it was 'hey, Mars Girl,' whenever someone wanted to annoy me.

I was only a little sarcastic with her during the hour, but Dargo, who had been watching, gave me an annoyed grimace when she took over the helmet. She used more disinfectant spray than was necessary. But Oz gave me a broad smile and a thumbs-up.

When Paul came out I touched his arm and cut my eyes in the direction of my room. He smiled, but wasn't going to get quite what he expected.

You don't use paper wastefully in space. But it's one way to write something down and know that no electronic snoop can sneak a copy. As soon as we entered my door, I handed him the folded-over sheet that started KEEP TALKING—DARGO'S LISTENING! Underneath that was a summary of everything Red had told me about the frequency-modulation message, and our tentative plan.

We chatted, mostly me talking, about our VR interviews. We undressed and I called for music, an obscure whining

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neo-romantic guitar/theremin collage by some Finnish group whose name I couldn't even read. But it was loud.

When he finished reading, we got into bed and made appropriate sounds while whispering under the music.

He nuzzled my ear. "So we do nothing until the Other responds. Then Red—and you and I and Fly-in-Amber—will send them back a message. In Red's language."

"Right. Can you build a radio transmitter?"

"We already have one that's rarely used. We could point it at Neptune and talk away."

"I don't think that would be safe."

"Probably not, if she's being fanatically thorough. But we don't have an electronics lab on this side. You can't build anything without parts.

"So couldn't the existing radio have a little accident? *It's* got all the parts."

"God, you're a devious woman."

"Is it possible?"

"Yes, of course. I'll study the wiring and be ready to disable it. In the course of testing the 'repairs,' I'll send this gibberish out toward Neptune.

"But there's one thing you and Red missed. Dargo doesn't have to be that afraid of punishment when she admits to having spied on you. What can they do—extradite her to Earth? Dock her pay? There's nothing to buy here, and we're already in a kind of prison."

"Well, Oz and probably the others would help us pressure to have her relieved of responsibilities. Deny computer access."

"That could work. Make her stare at the walls until she begs to be thrown out the airlock."

"I like the way you think." I straddled him. "The music's going to climax in about two minutes."

"Slave driver." But he managed a coda.

7. Language barrier

Allowing for speed-of-light travel time, the Other took only twenty-some minutes to react to the Drake message—which meant that most of the response must have been prepared ahead of time, and it only had to choose which button to push.

If, that is, it had been honest with Red when it described its temporal limitations. It did occur to me that there was no compelling reason for it to tell us the truth.

Or to lie, if it was as powerful as it claimed.

The answer to the message came in spoken English, in an odd American accent, which Earth quickly identified as David Brinkley's, a newscaster from a century ago:

"Peace is a good sentiment.

"Your assumption about my body chemistry is clever but wrong. I will tell you more later.

"At this time I do not wish to tell you where my people live."

Then it began a speech in a slightly different tone, that could have been prepared years ahead of time:

"I have been watching your development for a long time, mostly through radio and television. If you take an objective view of human behavior since the early twentieth century, you can understand why I must approach you with caution.

"I apologize for having destroyed your Triton probe back in 2044. I didn't want you to know exactly where I am on this world.

"If you send another probe I will do the same thing, again with apologies.

"For reasons that may become apparent soon, I don't wish to communicate with you directly. The biological constructs that live below the surface of Mars were created thousands of years ago with the sole purpose of eventually talking to you and, at the right time, serving as a conduit through which I could reveal my existence.

"'Our' existence, actually, since we have millions of individuals elsewhere.

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On our home planet and watching other planets, like yours."

Then it said something that simplified our lives, mine and Red's. "This is a clumsy and limited language for me, as are all human languages. The Martian ones were created for communication between you and me, and from now on I would like to utilize the most complex of those Martian languages, which is used by only one individual, the leader you call Red." Then it went into about two minutes of low gravelly *wheedly-rasp-poot* and went silent.

"So what was that?" Dargo said.

Red favored her with a potato stare. "Please play it back for me."

He listened. "Can you speed it up by a factor of eight or so?"

"No problem," a voice said from the screen. "Just give me a minute. I can double the speed three times."

We waited, and then it came back sounding more like Martian.

"Not much in the way of information there. I can write it down for you, phrase by phrase. But it's mostly ceremonial—good-bye and a sort of blessing—and some technical information, which frequencies it will monitor for voice and for pictures. Though I think it probably monitors about everything."

"Why was the initial message so slow?" asked the screen.

"The Other said that it had spent days translating that English message and rendering it as American speech. It recorded it more than a year ago."

Red hesitated. "We talked, Oz and Carmen and Paul and I, about how slow their metabolism must be because of the low temperature of their body chemistry. They must move slowly." He wasn't going to say anything he'd learned from the still-secret message.

"Talking with them is not going to be anything like a conversation. But we are all accustomed to having a time lag between saying something and hearing the response, in talking with Mars."

"Why did it wait?" Dargo asked. "First there was all that indirect mumbo jumbo, hiding the Drake message in the strange oration that the yellow Martians had buried in their memories. Now we find out that it could have just contacted us directly. In English!"

"Dargo," Oz said quietly, "we don't know anything about their psychology. Who knows why it does anything?"

"It's protecting itself," Moonboy said. "Maybe even trying to confuse us."

"It does know *our* psychology pretty well," I pointed out, "after eavesdropping on us for a couple of hundred years."

"And it knows you," Red said. "Of you."

"Me personally?"

He nodded. "The Other knows of our special relationship and would like to exploit it, making you its primary human contact, through me." I wondered whether he'd just made that up.

"How could it know something like that?" Dargo snapped, for once mirroring my own thoughts.

"It has access to any public broadcast. Her relationship to me is well documented." He made what might have been a placating gesture. "Of course, Carmen will share what she hears with everyone, and we will take input from anyone."

"I don't like it. You or she could make up anything, as long as you're working in a language no one else can translate."

"I will tell the Other of your objection."

"And how will I know that you have?"

"Have I ever lied to you? Lying is sort of a human thing." Paul glanced at me and glanced away. We both knew that wasn't exactly true. Red had come up with the suggestion that we feed Dargo an innocuous, half-true translation.

"Even if you completely trusted Red," Oz said, "as I do, there's no reason to assume that the Other is being straight with *him*. As Dargo said, it could have communicated with us directly from the beginning, if it had wanted to."

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Moonboy nodded. "It must have its own agenda, its strategy." To Red: "We still don't know how long this whatever, this hypnotic suggestion, has been part of the yellow family's makeup?"

"None of the family can tell us anything useful. They say it must have been there forever, ever since the Others created them. Which would be fine, except for the number."

"Ten to the seventh seconds," Moonboy said.

Red nodded. "It would require that the Others, or this Other, could predict 27,000 years ago, how long it would take for humans to get to Mars and bring a Martian back."

"A yellow one," I said.

"Wait," Oz said and laughed. "We don't have any reason to assume that the number is *right*. The Other isn't some sort of infallible god. That 27,000 years might have been its best estimate two thousand years ago, or ten thousand, or fifty—whenever you Martians were initially set up."

"At least 5,000 ares. We have reliable memories that far back—at least the memory family does."

"You think so." Oz was still smiling broadly. "But look. If the Other could program the yellow folk, the memory family, to flop down and deliver a prerecorded message when they saw the red laser—then what else might it have programmed them with? Maybe five thousand ares of bogus history."

Red grabbed his head and buzzed loudly, laughing. "Oz! You could be right." He buzzed again. "Like your religious humans who claim God created the Earth six thousand years ago, with the fossils in place. Who can say you're wrong?"

"An areologist," Oz said. "Quite seriously. We have Terry and Joan on Mars right now, nosing around your city, trying to date it. What if there's nothing that's more than a few thousand ares old? A few hundred?"

Red clasped himself with all four arms, which usually meant he was thinking. "It's not impossible. I have direct evidence, written communication, with only three previous leaders, with mention of a fourth. Less than a thousand ares." He turned to Moonboy. "Have Joan and Terry found anything older?"

"I don't think so. But they're still doing preliminary work, being pretty cautious."

"We must have them try. Dig down for things to date. This is fascinating!"

What I myself found fascinating was the way Red had changed the subject away from "Have I ever lied to you?"

8. Signal-to-noise ratio

Red wrote out the message that the Other had transmitted after its English one, and it was as innocuous and plain as the earlier secret one had been threatening and complex. Basically, "I want to cooperate, but you must let me go at my own slow pace."

I searched my room for a microphone but found exactly what I'd expected: nothing. You can buy one at Cube Shack not much bigger than a flea.

Red asked everyone on our side and most of the people on Earth side whether they had questions or messages for the Other. I knew he wanted a long transmission so that his own part would be hidden in the volume generated by others.

News came that my mother and father were coming on the next shuttle from Mars, which pleased me, though I had to admit I hadn't missed Dad. So Card would be informally adopted by the Westlings, which no doubt made him one happy boy. Barry got away with murder, which happens when your mother is a novelist and your father is a crazy inventor, no matter what their job titles claimed.

Over the next two days, I had eight more VR interviews. The most trivial was one from my old high school, and the most interesting was with a panel of

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"xenopsychologists" convened at Harvard. The weirdest was the last one, from the Church of Christ Revealed, who thought the whole thing, from the Space Elevator on, was a hoax the government was perpetrating for its own obscure purpose. I told them they could go out and watch the Space Elevator work; they could aim an antenna at Mars and intercept the signals that emanated from there whenever the right side was facing Earth. The interviewers smiled conspiratorially, saying "Yes, that's what we're *supposed* to believe," or "It's all explained in the Bible, and it isn't like your people say."

After putting up with that, I went back to my place feeling sort of like the most dispensable member of the team, and what should greet me but a message from Dargo: "Please come see me at your earliest convenience."

I put on my exercise clothes and went up to row and jog. Moonboy was on the rowing machine, so I jogged for a while on the treadmill watching Earth news. So little of it seemed important.

So my "earliest convenience" was after 250 calories of running and a mile on the oars. I didn't shower, but went sweatily down to Dargo's office.

Her nose wrinkled when I stepped in and closed the door behind me. Without preamble, she said, "Have you ever heard of S2N?"

"No . . . a sulfur and nitrogen compound?" Even my dim recall of valences told me that couldn't be it.

"It's a research tool I just found. It dramatically increases the signal-to-noise ratio in a collection of audio data."

Her ubiquitous clipboard was on the desk. She stabbed a button on it, and my voice clearly said, "That's a kind of insect?" Then Red started the mayfly analogy, Bach a faint whisper in the background. She switched it off.

"I have it all," she said. "The superslow Others, the faster one on Triton, the rationale for Red's secret language. Our mayfly helplessness in the face of their ancient wisdom."

"So. Now you know everything I do. You still can't—"

"Maybe I know a little *more* than you do. You accept what your Martian friend says as the pure truth. I do not."

I didn't trust myself to say anything and just nodded.

"There's nothing like all that even implied in the actual communications that everybody's seen and heard from Triton. I think Red made it all up."

"Made it up? Why would he do that?"

"It's simple, really. His power over his tribe, and now his usefulness to us, is dependent on the uniqueness of his supposed language. What if it's just another Martian dialect? Our linguists are cataloguing similarities among the other three. With a large enough sample, I'm sure Red's will fall into line."

She didn't know what she was talking about! They weren't "dialects," any more than Chinese is a dialect of Turkish. And no linguist was yet able to utter "two plus two is four" in any of the tricky languages. That they had sounds in common was not very mysterious.

"I'm sure that could be true," I heard myself saying, "in theory. But I'd need more than supposition."

"Of course you would. And I know you consider him a friend and wouldn't ask you to betray him. Just try to listen to what he has to say objectively—with my ears as well as yours. Try to entertain the possibility."

"All right." Among the possibilities I could entertain was that Dargo had finally popped her cork. "But what if he *is* telling the truth? We don't dare go public with your thesis. The Other might learn of it and push the button."

"Absolutely. Utmost caution and secrecy."

I left with my head sort of spinning, trying to figure out exactly what kind of game Dargo was playing.

I couldn't believe she'd had a change of heart about me, trusting me enough to enlist my aid in her scheming. But she

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did have me in a perfect trap—I couldn't report her eavesdropping without revealing Red's deadly secret.

Could she be right, though? The "deadly secret" a sham, part of an elaborate hoax?

No. That would require advance collusion with the Other.

Maybe she was setting me up for a double-double-cross, having me spy on Red and then telling Red, to destroy his trust in me. I couldn't say anything to him or Paul, now, without the risk of being overheard.

But I could write. I didn't want to trust e-mail or anything else electronic, but I could afford a little paper.

Paul first. Before I even went to the shower, I wrote down everything I could remember about Dargo's convoluted scheme, in small print on both sides of a half sheet of paper, and folded it up small.

We met in the hall as I was coming back from the shower, and when we kissed hello I slipped it into his pocket. He gave me a little nod.

I spent a couple of hours trying to extract something useful from a structural-linguistic approach to the Martian consensus language, by an Earth researcher who'd done a lot of work with cetacean communication. I think she was hiding her lack of actual results with a lot of pretty charts and weak analogy. Both creatures do communicate with repeating patterns of noises. But the dolphins are mainly saying "Follow me to fish," or "Let's fuck." The Martians apparently indulge in abstractions.

Paul wasn't at late dinner. I ate with Oz and Meryl. She brought up the subject of Dargo. "It's strange. With all this exciting new stuff happening, she seems angry rather than interested."

Oz said that Dargo will be Dargo. "She's an administrator at heart, not a scientist. Administrators don't like the unexpected."

I could have given them both a couple of data points, but had to refrain.

When I got back to my place, there was a humorously pornographic love note on my screen. I brushed my teeth and went over to Paul's.

For the first time in my life, I felt the foreplay went on too long. I could see my note and his answer on his desk.

He fell asleep, or acted as if he had, right afterward. I padded over to his desk and read the note, a page of small neat capital letters.

SHE HAS YOU IN A DIFFICULT POSITION. ME, TOO, ASSUMING SHE ALSO RECORDED OUR "CONVERSATION" WHILE MAKING LOVE. OF COURSE I'LL PRETEND THAT I DON'T KNOW SHE KNOWS, AT LEAST UNTIL SHE REVEALS IT TO ME.

YOU THINK SHE HAS EITHER LOST IT OR HAS SOME NEFARIOUS PLAN IN MIND. LET ME SUGGEST A THIRD ALTERNATIVE: THAT SHE IS RIGHT.

WE ONLY HAVE THE MARTIANS' WORD FOR THE STORY THAT THEY DIDN'T KNOW ABOUT THE BEING ON TRITON. WHAT IF IT HAD CONTACTED THEM YEARS AGO—DOZENS OR HUNDREDS—AND SWORE THEM TO SECRECY?

OUR SCIENTISTS HAVE NO IDEA HOW THOSE RADIO/TV/CUBE RECEIVERS WORK. THE OTHER COULD HAVE CONTACTED THEM RIGHT AFTER THE FIRST RADIO SIGNALS FROM EARTH AND SAID, "THE ALIENS (HUMANS) ARE COMING, AND THIS IS WHAT YOU HAVE TO DO."

MOST OF THEM SEEM STRAIGHTFORWARD AND HONEST, BUT THEY'VE HAD A COUPLE OF HUNDRED YEARS TO STUDY HUMAN BEHAVIOR, WATCHING US LIE TO EACH OTHER REPEATEDLY—AND BESIDES, HOW COULD YOU TELL IF ONE WAS LYING? THAT SHIFTY LOOK IN ITS FIFTY EYES?

AS YOU SAY, RED REQUIRED YOU TO MISREPRESENT THE TRUTH ABOUT THE OTHER, AND THEN VOLUNTEERED TO LIE HIMSELF, TO MISLEAD DARGO ABOUT THE HIDDEN

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MESSAGE.

I WOULD SAY IT'S MORE LIKELY THAT THE MARTIANS HAVE BEEN STRAIGHT WITH US. BUT WE OUGHT TO KEEP THE OTHER POSSIBILITY IN MIND.

YOU MIGHT USE DARGO'S DEVIOUS MIND. SHE MIGHT COME UP WITH A WAY TO TEST RED WITHOUT HIM NOTICING.

I HATE LIKE HELL THE THOUGHT THAT SHE MIGHT BE RIGHT.

I couldn't sleep. I kissed Paul goodnight and silently went back to my place, where I memorized his note and then destroyed it, tearing it into small pieces and rolling them up like pills, then swallowing them with sips of water. Carmen Dula, human shredder.

When Dargo had said it, it sounded like paranoia. From Paul, it sounded almost reasonable. I had to consider, reconsider, the argument on its own merits.

Go back to the beginning:

1. Red did not initiate contact. He showed up only when it was necessary to save my life, an event he couldn't have predicted. (But that situation would have presented itself sooner or later, with somebody.)

2. The Martians didn't know that I'd get the lung crap—which required their life-saving intervention. (But maybe they did know—Red certainly didn't waste any time responding—and maybe they're lying about every Martian getting it. Maybe it was genetically tailored for humans.)

3. The effect of the ruby laser on the yellow family proved that they didn't know about the Other beforehand. (Or that they were good actors.)

4. They don't know how their technology works, themselves. It's self-repairing, eternal. (Or so they say.)

5. For a deception to work would require the whole Martian population to live a lie, all the time. (Or maybe just the dozen or so we're in constant contact with—and they were chosen by the Martians, not at random.)

It *would* have to be all of them, eventually, since as far as I know there were no restrictions on human investigators like Terry and Joan.

I did finally sleep, and had a disturbing dream. I was at a party on Earth, a formal one like a gallery opening. I moved through it like a ghost, glass in hand. No one paid any attention to me.

Except a large handsome man with red hair and a red tie. He studied me intently. But when I went toward him he receded somehow, dream logic, and disappeared.

No one on our side was, strictly speaking, a linguist, but Josie spoke Chinese and Spanish as well as English, and had been hammering away at consensus Martian. Oz had Latin and Greek as well as Norwegian. I made a "drinks" date with them, to get their angle on the Martian languages, just before my next tête-à-tête with Red.

Our diets in New Mars were controlled about 10 percent by our own input, and 90 percent by the Mars Corporation experts, who weren't about to send us up a bottle of Jack Daniels whenever we felt the need. But we did have a carboy of ethyl alcohol with a computer-controlled tap. You showed it your retina and it dispensed a shot or two of "vodka," which was pure ethyl alcohol distilled from Hilton garbage, with a little lime flavoring, cut with fifty percent absolutely pure water from Hilton sewage. You could mix it with various things. I chose grape juice concentrate and another tumbler of water, to make it resemble wine.

Oz took two ice cubes and a drop of "bourbon concentrate." Josie tipped hers into a glass of orange juice.

"No human will ever be able to really speak a Martian language," she said, "without mechanical help. Ten or twelve of the phonemes, you'd have to be a cricket or a garbage disposal to

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make." Phonemes are the elementary sounds that make up a language.

"And they have lots of them? Phonemes?"

"Around seventy. As opposed to forty-some for English. Some human languages have more than a hundred."

"But you can pronounce them all." He somehow made a noise in his throat like a champagne cork coming out of a bottle, beginning the sentence, "Xhosa can be a challenge."

"There's remarkably little repetition," Josie continued. "Human languages have words like 'the' and 'and' that keep cropping up. If Martian has them, they're pretty well hidden."

"It's worse than that," Oz said. "You know about those Poles in Earthside?" I didn't. "They're just analyzing sounds, taking every recording of Martian speech we have and pushing it through a computer routine that counts phonemes. Or at least sounds that repeat.

"There are eight related sounds, like throat clearing, that occur more often than others. The other seventy-some kinds of sound seem to be evenly distributed—one sound is as frequent as any other."

"If you edit out the throat clearings," Josie said, "it sounds weirdly like Hawaiian."

"Wannalottanookie," Oz growled.

"Tell me about it. And you've been following the dictionary saga?"

"Last I heard, they were still on square one."

"Yeah, square zero. Like they never say a given phrase the same way twice. But they understand each other. And they can't explain *why* because they never have to *learn* their own languages."

"Except for Red."

"Who presents his own set of problems," Oz said. "He was born knowing all the other languages, but then had to learn his own, which nobody else is allowed to learn—including us."

"I wonder why," I said. "It's been a deep dark secret from the beginning."

"We do have that small sample, in the last message from Titan. The Polish guys analyzed it, and maybe it is significantly different. Too small a sample to say for sure?" He looked at Josie.

"Seven hundred thirty-eight syllables, forty-some of them the throat clearings, which I think are some kind of punctuation. The same phoneme-type sounds as the other languages, but it's nothing like an even distribution.

"The Poles did a breakdown, which I can send you. Some of those sounds only occur two or three times. About fifteen of them make up ninety percent of the message."

"So Red's language is more like a human one?" I said.

"It's also the only one that has a written form. If you asked him nice, do you think he'd give you a sample?"

"If you twisted his arm—or all four of them?"

"When I asked him back on Mars, he said it wasn't possible—not like 'it's not done' or 'it's illegal,' but just not possible, like walking on the ceiling."

"Not possible for you to read," Josie said, "or not possible for him to show to you?"

"Both. They weren't 'his' to show—even the records he wrote belong to his family, not himself—and if I did look at them I wouldn't see anything that looked like writing." I took a long sip of ersatz wine. "He just laughed when I tried to press him on it. I couldn't even get him to write a sample down, though he writes human languages well enough. You can't write it with a pencil or pen or brush, he said. And then laughed some more and changed the subject."

Paul came scrambling down the ladder. "Thought I might find you here." I'd left my phone in the room. "You were talking about Red?"

"Red and languages," Oz said.

"There's some news." He plopped

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into a chair. "Five or six minutes ago. The Martians are mating! Joan has a cube of all but the first few minutes."

"Martian porn?" I said.

"Whatever works for you. But what's interesting is the buds aren't being grown to replace dead Martians, but rather the ones that are here in New Mars."

"Wait. Not Red."

"Even Red." He shrugged. "In fact, it was apparently Red's idea. Can't wait to hear his side of it."

I checked my wrist. "I have an appointment with him in less than an hour. Come on along. You too," I lamely added to Oz and Josie.

"Too crowded," Oz said. "You can catch us up later." He stretched. "Think I'll take a little nap and sleep off all that booze."

"Me too," Josie said, and slid her half-full glass over to Paul. "If you don't mind my germs."

"Love your germs," he said.

9. Betrayed

I knew that Red was going to be busy with some Chinese xenobiologists up until our meeting at 1800, so I didn't check in early. I called on the hour, from outside his door, and said that Paul was with me. Red said he was welcome.

We'd dressed warmly, of course. Over his Corporation uniform, Paul wore a threadbare wool cardigan, souvenir of New Zealand, and a knitted wool cap with incongruous snowmen that he'd won in a poker game on Mars. I just had an extra shirt and wore jeans over my exercise shorts and had made a cap out of a bandana, the way Dad had taught me when I did Halloween as a pirate in the fourth grade.

The temperature dropped more than twenty degrees when we slipped into Red's quarters, closing the door quickly behind us.

It took a few moments to become accustomed to the low light. Red had the Martian equivalent of an indoor garden, trays of mushroomy things growing under dim bluish-gray light. The wall cube that he'd been using with the Chinese still had a slight glow.

There were cushions of various shapes and sizes, all a neutral gray, scattered in front of the cube, for human visitors. He gestured in that direction. "Carmen, Paul, it is good to see you. Please have a seat."

I wondered whether he ever considered the psychological advantage he had, always standing over his guests. Of course he did.

"We just heard about the blessed event," I said as we sat down, "on Mars."

"An interesting euphemism. So often otherwise, on Earth."

"You're requesting a replacement for yourself," Paul said. "Do you expect to die soon?"

He shrugged slowly. "Like you, I could die anytime. But the reason for me to rush my replacement is less philosophical than economic.

"I've come to realize that I will never go back to Mars, and nor will any of the other Martians here. It's expensive, in terms of redundant life support, and there is no way my leaving would profit the corporation. On the contrary. No one else can deal with the Other as efficiently as I can.

"And it's inconvenient for Mars, to have their leader so far away. Simple yes-or-no decisions can be delayed by more than a half hour."

"Used to be half a day," Paul said.

"Yes, I'm grateful for the repeater satellites. Still, the families should have a leader who is not absentee."

"What will your status be," I asked, "after he's matured?"

"'She,' in this case. I suppose I'll play an advisory role for a while. But I'll probably be more involved with the Other than with Mars."

"This will be the first time there have been two Reds alive at the same time."

"Ha ha. It doesn't bother me if it does-

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n't bother you."

"What I mean is, in all of your history you've only had one leader at a time."

"And that will be her, once she learns what she needs to know. Which might be twelve ares, like me, or a couple of ares less or more. And then I will just be the old guy who went to Earth."

"Who incidentally knows the secret language and speaks to creepy aliens and such."

"True enough. I won't forget the language. I don't know whether it's possible for us to forget a language."

A chime rang and Red made a kissing sound at the cube. A small square appeared in the middle with Dargo Solingen's face. The background showed that she was standing outside the door.

"What may I do for you, Dargo?"

"I just heard about the . . . creation of your replacement and wondered if I could talk to you."

"Carmen Dula and Paul Collins are here."

"I know that. I have no objection."

Red inclined his head toward me and I shrugged.

She came in dressed in regular short-sleeved coveralls. At least she wouldn't be staying long.

She dove right in. "This may seem trivial, but some people have expressed concern about protocol. Does this . . . budding mean you are no longer the leader of the Martian people?"

"That was always a simplification, as you know. And we aren't exactly people. But it's true that the formation of another individual with my characteristics makes it less simple. If a parallel were to be drawn with human history, I suppose I am a regent now, ha ha, as much as a leader. The new Red will take over when she knows enough and is strong enough."

"Physically strong?" she asked.

"She will be, but no. You would say 'she has leadership qualities,' though I think it's more definite with us. The things that she reads while learning her language, mine."

Dargo stared intently at him, perhaps deciding what to say. "I don't know whether Dula has told you. I was able to decipher the secret conversation you had with her."

"I hadn't gotten around to telling him yet."

Red was louder than usual. "You are allowed to do that?"

"No rules cover it. As no rules cover what kind of music you have in the background when you—"

"That's bullshit," Paul said. "Space law is an extension of international law. If we had a jail we could put you in it."

"I don't think you could, but it's moot." She looked at Red. "Your claims about what the Other could do to us . . . I don't understand why you would entrust that knowledge to these two, but not to the authorities."

"Trust," Red said. "Your word. I should have trusted you?"

"Yes. If you had trusted me . . . nothing would have happened."

The cold air got heavier. "So what happened?" I was almost whispering.

"To extract your actual conversation from my recording, I had access to tools that drew the attention of security authorities. They asked me to cooperate and presented a World Court subpoena for all the material on which I'd used those tools."

"We're not on the *World,* Dargo," I said.

"My god," Carl said. "What if it gets out? You may have killed us all."

"Don't be so dramatic," she snapped.

Red shook his head. "He may be right. I suppose it was only a matter of time, but I'd hoped it would be after *my* time.

"Did you stress the need for secrecy—I mean the possible consequences if the Other learned of this breach of confidence?"

"They have heard exactly what you said, including the fantastic threats."

"Here is a fantastic threat," he said,

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with a gesture I'd never seen: all four arms extended straight out and trembling. "Would you like to be the first human being to be killed by a Martian?"

He took one step toward her and she made for the door with unsurprising speed.

She left the door open. I closed it softly. "What should we do, Red?"

He hugged himself in thought. "I wish I knew more about the Other. We have ancient traditions about their nature. But about this particular individual, you know about as much as I do . . . well, there is one thing. It's not reassuring."

"What?"

"You know the Others on their home planet are technically immortal. That is, actually, they spend most of their lives as dead as a rock. But they are revived every now and then. Do something and then return to the dormant state.

"This one is not that way, because it has to stay on the job until the job is done. The ten-to-the-seventh seconds figure, that's how long it has lived. Continuously, for 27,000 years.

"And it envies its relatives for their periodic rest."

In the dark cold, I broke into a sudden sweat. "It wants to die?"

"To die, or to return to where it can have its long rest. I'm not sure quite which state it was referring to. Or whether it feels there is much difference."

Maybe that was why Martians have such an ambiguous attitude toward death. It might reflect the attitude of their makers.

"Should you prepare it for the possibility of exposure?" Paul asked.

"As I say, I'm not sure. That might just make it push the button—or it might have been lying about that.

"Let's not take the chance," I said. "Let's hope her 'authorities' are more cautious than she was."

Paul nodded, but his expression told how little hope he held out for that.

* * *

10. Trojan Horse

It took less than half a day. Unable to sleep, I got up around four and occupied myself answering mail that had piled up from family and friends. I was writing a note to Card when the screen chimed and a red exclamation point started to strobe in the upper right-hand corner.

I asked for news but then toggled *Life Today* rather than the *Times*. Inch-high letters as red as the strobe: TRITON MONSTER THREATENS EARTH DOOM!! *Martian Go-Between Reveals All!*

I started to read the story, but it kept blurring. How could they *do* this?

The phone pinged and it was Paul. "Sorry to wake—"

"I'm awake. I saw."

"Jesus. What do we do now?"

"I think the question is what is *it* going to do now."

"Yeah. Damn. Meet me down at the coffee?"

"There'll be a run on it." I dressed in a hurry and pinned my hair out of the way.

He was waiting for me with a cup. I got one sip and both our phones went off simultaneously.

It was Ishan Jhangiani, the Earth side Science Coordinator. "This is a general announcement. I want everybody, human and Martian, to be at Earth A, on Mars side, or Assembly A, on this side, in forty five minutes, at 5:30. I'm afraid this is a matter of life and death."

The combination of tepid coffee on an empty stomach and bad news sent me rushing to the head. After I'd emptied that out I felt better, but my skin was cold and greasy and my hands were trembling.

Paul came out of the other head, and he didn't look much better than I felt.

I looked into my cup. "I'd like to have one cup of coffee that was actually hot before I die."

"Better do it now.' He sat down heavily. "Sorry."

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"Gallows humor's better than no humor at all." I looked at my wrist. "We've got forty minutes." I nodded at the ladder.

"No, I couldn't. Thanks, but I couldn't.

"Me, neither, actually." I rubbed tears away. "I could kill that bitch!"

"We should've grabbed her and thrown her to Red."

"Yeah." I laughed, but it didn't sound like a laugh. "Not that it would change anything.

Speak of the devil—my phone pinged and it was Red. "Carmen—comm says there's a message coming in from Triton. I think we should be at Earth A as close to now as possible."

"We're down at the mess," I said. "Beat you there." Paul nodded and stood and followed me up the ladder.

Only Oz and Moonboy were there before us. Oz gave me a wan smile. "Josie will be along. She takes a few minutes to wake up."

The cube was on, but it was a blank blue. "Red said they're getting some communication from Triton."

"Maybe it will be 'Send me the head of Dargo Solingen.'"

"Wonder if she'll be here."

"No. Jhangiani invented 'house arrest' and put her under it. She's locked in her room with no contact with the outside world. Josie or I come by every three hours to take her to the head and give her bread and water."

"She'll sue. If any of us live through this."

"Let me be a character witness," Moonboy said. "I've been her special little project for about ten years." I wondered how many of us there were.

Ishan Jhangiani appeared on the cube and looked at us. "No Martians yet?"

"Red's on his way, Dr. Jhangiani. He said there was a message?"

He nodded. "It started five or six minutes ago. We're recording—" His image suddenly dissolved in a shower of static, and the room lights flickered.

Paul crouched instinctively. "Shit. What's that?"

"Hello?" Jhangiani's voice came out of the swirling white noise. Then his image returned. "That was . . ." He inclined his head and touched an ear. "Oh my god . . . do we have a picture?"

The cube went black and then showed a familiar sight, the Hubble planetary camera's view of Neptune, an almost featureless blue ball accompanied by the tiny pale circle of Triton and specks of light that were Nereid and a couple of other small satellites.

Then Triton exploded.

The pale circle suddenly was a ball of intense white, that grew brighter and brighter, and then the screen went white with static.

It darkened again and an unfamiliar voice said, "This is real time."

The view was the same as before, but the dot of Triton was surrounded by a glowing circle, visibly expanding as we watched.

Red was standing in the door. "What's happening?"

"Maybe you can tell us," Paul said. "The Other evidently did something interesting."

Jhangiani came back into the cube. "That explosion reached a brightness of—27 magnitude. For a moment, it was slightly brighter than the Sun."

"Forty times as far away," Paul said. "So for a moment, it was putting out 1600 times as much energy as the Sun. How could it do that?"

"Perhaps Red can tell us," Jhangiani said. "This is the message it sent, a few words of English and then the slowed-down Martian." He nodded at someone. "We've sped up the Martian for you."

The David Brinkley voice again: "I monitor your news broadcasts, of course, and the most recent ones have forced me to make a decision. I am sorry. You already know too much." Then there was about two minutes of accelerated Martian. And then static.

Red didn't say anything. "What did it

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do?" Jhangiani asked.

"It . . : went home." He hugged himself. "It may have literally returned to its home system. Or it died. The words could be the same. As if, if someone goes to Earth, he could be going to a planet or being buried.

"On going home, it destroyed every trace of its technology that was on Triton. It didn't want to risk humans finding it and copying it."

He paused and continued in a halting monotone. "It did this even in the knowledge that soon there will be no humans alive on Earth. The hundred on Mars will presumably live."

I swallowed back bile. "What's it going to do, Red?"

"It's already done." He rocked back and forth. "I'm sorry. I swear I didn't know." He shook his head.

"Didn't know what, Red?" Oz said. "Is there anything we can do?"

"I'm a time bomb. A Trojan Horse. The Other wanted me on Earth, or nearby, before it turned on the beacon that started all this. So that . . . if things didn't work out, I could be forced to put an end to it."

"How can that be?" Paul said. "Even if all your mass was turned into an explosion—"

"I mass about a hundred kilograms. By em-cee-squared, that comes to nine times ten to the eighteenth joules. That's equivalent to twenty hundred-megaton nuclear weapons.

"Earth could survive that, since we're 22,000 miles away from the surface. But fusion doesn't begin to describe the forces involved. Could fusion have accounted for the Triton explosion?"

"I guess not?" Paul said. "No, of course not. Did it say how big . . . how destructive you could be?"

"Enough to boil away the ocean on the side of the globe we're facing. Blow off a lot of the atmosphere."

"When?" I asked.

"Days." He shook his head. "Maybe two, maybe three.

"The energy doesn't come from here. It's bleeding off a thing like a black hole in an adjacent universe. We've been using it domestically since we first came to Mars."

"The mysterious power source for all the machines," Oz said. "The light for the hydroponics."

"I suppose. I knew nothing about it until today. But the Other says it had another thing like me on Triton, and it only drew off power for a couple of hours, concentrating it for the explosion. This will be orders of magnitude more."

"With all due respect, Red," Moonboy said, "we should lock you into the shuttle right now and fling you as far away as possible."

Red agreed. "That might be the most practical course. Or you could kill me, or I could kill myself, in case the collection process requires me to be alive.

"But the Other didn't say anything about either possibility. It could be that I would explode prematurely, automatically, if I died or left the vicinity of Little Mars."

"Which might be desirable," Sophie said, "if it caused an explosion with less force. We . . . would die, but the Earth might be spared."

Red nodded. "I can't say, one way or the other."

I tried to listen with Dargo's skeptical ears. The Other might have been lying to him. Or Red might be lying to us. "It could just be a test," I said. "The Other observing to see how we react to this extremity."

"If it were a human or a Martian, I would say that was possible." Red shook his head. "Not the Other. I don't think we have any hope in that direction. Moonboy is right; I should be sent away. But I don't know that I can go far enough in two days."

"I have an idea," Paul said. He licked his lips and stared straight ahead. "Let's put Red on the other side of the Moon. Get three thousand kilometers of solid

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rock between Earth and the explosion."

"Ha ha. Perfect. I'll do it now."

"You're not doing it yourself. You need a pilot."

"Paul . . ."

"We don't need the whole shuttle; just the Mars lander. We'll compute the right time for a slingshot transfer and have it blow the separation bolts. We do the transfer and I come in ass-backwards, kill velocity, look for a place I can land with skis."

"It's suicide," Moonboy said.

"No, I can do it; plenty of smooth areas on Farside. I'll take a few weeks' life support. If Red doesn't blow up, the *Tsiolkovski* will be coming in with a pilot next week. She can come get us."

"You don't have to be aboard," I said, trying to keep the pleading out of my voice. "You can pilot by VR."

"Afraid not. No repeater satellites. Once I'm on the other side of the Moon, I'm out of contact with here. It's seat of the pants, just look and do. I'm confident I can land it."

"And if you're wrong," Red said, "we'll just crash. That might set off the explosion, or it might prevent it."

"You're so cheerful," I snapped.

"We don't agree about death," he said. We had argued about that, on Mars and here. He invoked the human philosopher Seneca, saying that he had not existed for 13.7 billion years and apparently enjoyed that state. One spark of a couple of centuries' life, and he'd be back to not existing for some trillions of years and would enjoy it as much as the previous billions.

"Which leads to a solution," he said. "Paul, if we just set up the thing to crash on the other side of the Moon, we won't need a pilot. I'll just be the cargo. Dying is not so important to me."

"Red, that's great! You don't have to be a fucking hero, Paul!"

Paul didn't look at me, but he wasn't looking at anybody. When he spoke, it was like a class recitation: "Red, I appreciate it, but it's not a simple computation. The Mars lander was not built for this, and it will be out of touch for the most crucial phases."

"So he *crashes!*" I said. "He just said—"

"No. With one kind of mistake he crashes, but with most others he stays in orbit. It's not like dropping a ball. Things in orbit tend to stay in orbit, at least in the short term. And whenever he was not directly behind the Moon, he'd be the doomsday machine for Earth."

"How long would the flight take?" Oz asked.

"I could get it down to a day and still have plenty of fuel for the landing maneuver."

"We'd better get busy."

"Can I . . . could I come?"

His face was completely still. "No. Darling. Minimum life support, maximum maneuverability." He stepped toward me and took me in his arms.

He whispered, speaking slowly and carefully. Only I could hear: "You know I am not so far away from Red with the death thing. I love you and will regret the years we would have had together—do miss them already—but at worst, in one instant I'll only be back to where I spent most of forever.

"And we had a wonderful time while we had it. Better than most people get."

I was crying and didn't try to say anything other than the obvious.

11. Endings, beginnings

In the last few hours neither Paul nor I brought up the possibility that nothing would happen and he would be back in a couple of weeks. As if talking about it might have jinxed us.

Red did drop a hint, though, obliquely. I was waiting by the airlock that led to the shuttle, and he came walking up with a bundle tucked under a large and small arm. It was the gauzy tent he wore when he ventured out onto the surface of Mars.

"Just for safety's sake," he said. "You

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never know." It would protect him for a couple of hours' EVA or moonwalk, or keep him alive for a while if the shuttle's life support shut down.

Paul came out of the airlock looking like a Space Force recruiting cubeshot, gleaming white spacesuit. He had shaved his head and had feelie contacts pasted on his skull.

I was composed. Oz had given me a couple of slap-on tranquilizers, but I wanted to hold off on them until after the launch.

Paul put his helmet down and swept me up in an armored hug. That was not exactly the way I wanted to remember his body, hidden behind bulletproof plastic. But I could imagine what was underneath.

"You remember the day we met," I said, "throwing a pebble at the iguana?"

He smiled. "Yeah."

"Think you can manage to hit the Moon?"

"It's a lot bigger." He gave me a last hard kiss and stepped back. No goodbye or see you. Just a long intent look and then he picked up his helmet and went through the airlock.

When it closed, I put one of the patches on my wrist. When the reverberating *bang* meant they had launched, I slapped on the second.

We had saved one bottle of the imported Bordeaux for some future celebration. I held it for a long time, remembering. But then I put it back and went down to the mess and made a glass of grape juice laced with ethanol.

I carried the drink up to Earth A, where almost everyone else was gathered. I almost wished they had let Dargo out to watch the consequences of her judgment. But I would probably have said something or done something I'd later regret. If there was a later.

The Hubble showed the little ship drifting along in the bright sunlight, occasional background stars going by unhurriedly. Paul talked with technical people here and on Earth, and Red kept up a constant monologue. Fly-in-Amber said it was all apparently in Red's own language, a message for his successor. Or perhaps for the Others, eventually.

The alcohol and drugs made me very sleepy. I ate a hamburger because I knew I had to have something and then went up to my quarters and slept dreamlessly for twenty hours.

I awoke to my own timer, the phone, and the computer screen all buzzing and pinging. I turned them all off, knowing what they meant, and went to the head. Splashed water on my face and jerked a comb through my hair and went up to Earth A.

They weren't using the Hubble, because the Moon is too bright for it to focus on. Oz said it was a telescope in Hawaii. It showed the Mars lander as a small cylindrical shape, moving toward the limb of the Moon. I knew it would be decelerating, but you couldn't tell by looking.

Paul's voice was suddenly loud. "We'll be making planetfall, moonfall I guess, in about twenty-two minutes. Twenty-one. Lose radio contact in less than a minute."

The image of the ship and the Moon's limb were almost touching. "Hmm . . . I don't have any last words. 'Crash' Collins signing off. Hope this works. Dargo, I'll see you in Hell. Darling . . . darling . . . good . . ."

Well, at least Dargo would get all of her message, even if mine required a little imagination. Josie came up and held me from one side, and Meryl from the other.

Meryl sobbed. "People won't know he already had the nickname."

The view shifted to earthside, the nearly full moon high over a placid ocean. Maybe it was from the Hawaiian mountaintop where the observatory was.

After what seemed a lot longer than twenty minutes, a voice from the cube said, "One minute to touchdown."

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We held our breath for a minute. Then another minute. We didn't know what to expect.

After twenty minutes or so, people started drifting away, back to their quarters or down to the mess, or just to wander.

For some reason I kept staring at the moon, maybe wishing I was there in Hawaii, maybe not thinking anything much—whatever, I was one of the few people actually watching when it happened.

At first there was just a faint glow surrounding the moon, as if a wispy cloud had moved in front of it. Then it was suddenly dramatic.

People who have seen total solar eclipses say it was like that, but more so. A brilliant nimbus of pearly light spread across half the sky, the full moon suddenly a black circle in the middle, dark by contrast.

A crackle of static and a human voice. "Holy shit. That was close." Paul!

It was Red who had suggested the plan, which was probably not something a sane space pilot would have come up with.

After touchdown, when he was careening along on skis trying not to live up to his nickname, he should look for an area that was locally "uphill." Try to stop with the lander pointed at least slightly skyward. Then Red would get off, stand clear, and Paul could hit full throttle—get over the horizon and try to make orbit. When he disappeared from sight, Red would measure off ten minutes and then open his suit and die. That would give Paul time to make orbit. But not so much time that he would go completely around and be over Red when he died.

The supposition that Red's death would trigger the explosion turned out to be a good guess.

It was a combination of luck and skill. He could steer to a certain extent with the skis, and so when he had almost slowed to nothing, he aimed for the slope of some small nameless crater. When he slid to a stop, he was pointing about fifteen degrees uphill, with nothing in the way.

Red was already wearing his gauzy suit. He cycled through the airlock and picked his way down the crater side. As soon as he said he was clear, Paul goosed it. Once over the horizon, he tweaked the attitude so he got into a low lunar orbit and waited.

When it blew he was almost blinded by sparkles in his eyes, gamma rays rushing through, and he had a sudden feverish heat all over his body. Behind him, he could see the glow of vaporized lunar material being blasted into the sky.

That little crater that saved him really earned the right to a name. But it had boiled completely away, along with everything else for hundreds of kilometers, and in its place was a perfectly circular hole bigger than Tsiolkovski, previously the largest crater.

I thought they should name it Crash.

So every January first we present a petition for lifting the quarantine, and every year our case is not strong enough. But now there's a Space Elevator on Mars, so there's a lot of pretty cheap travel back and forth within the quarantine. After five years on New Mars we went back, and it was good to have a planet beneath your feet—and over your head as well.

Oz invented a Church of Holy Rational Weirdness so that he could marry me with Paul and not offend any of our sensibilities. I was pregnant and thought there were already too many bastards on Mars.

My first was a girl, and I named her after her grandmother, so I could see her smile. Her middle name is Mayfly, and I hope she lives forever. The second, with the same middle name, was a boy.

People who don't know us might wonder why a kid with jet-black hair would be named Red. ■

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The Accidental Time Machine, Joe Haldeman, Ace, $23.95, 278 pp. (ISBN: 978-0-441-01499-6).

Shadowbridge, Gregory Frost, Del Rey, $13.95, 259 pp. (ISBN: 978-0-345-49758-1).

Firstborn, Arthur C. Clarke and Stephen Baxter, Del Rey, $25.95, 367 pp. (ISBN: 0-345-49157-2).

Natural Ordermage, L. E. Modesitt, Jr., Tor, $27.95, 496 pp. (ISBN: 0-7653-1813-X).

Viewpoints Critical: Selected Stories, L. E. Modesitt, Jr., Tor, $25.95, 350 pp. (ISBN: 978-0-7653-1857-2).

Now and Forever, Ray Bradbury, William Morrow, $24.95, 209 pp. (ISBN: 978-0-06-113156-1).

Rewired: The Post-Cyberpunk Anthology, James Patrick Kelly and John Kessel, eds. Tachyon, $14.95, 420 + xviii pp. (ISBN: 978-1-892391-53-7).

The Nail and the Oracle, Volume XI: The Complete Stories of Theodore Sturgeon, Paul Williams, ed., North Atlantic Books, $35.00, 256 + xxxii pp. (ISBN: 978-1-55643-661-1).

The 2007 Rhysling Anthology, Drew Morse, ed., Science Fiction Poetry Association (www.sfpoetry.com), $12.95, 131 pp. (ISBN: 978-0-8095-7219-9).

In recent years, the dominant image of the future has been the Singularity, and I am writing this just after Singularity Summit 2007 (www.singinst.org/summit2007/index.html), held in San Francisco, made the news. The Singularity, we suppose, will happen when our machines became capable of guiding their own evolution faster than we can. This may follow very shortly on true artificial intelligence, which will mean machines that can set their own agendas, learn from experience, and plan. It may not require machines that are conscious in the same sense that we are.

If it happens, we can expect progress to accelerate tremendously and the world in which we live to change more rapidly than we have ever seen before. The future, some say, will become unpredictable, even from week to week. Humans may become irrelevant to government, business, and commerce. The machines will be the dominant players, and humans will be something that has to be managed, kept from causing trouble.

And, says Joe Haldeman in **The Accidental Time Machine**, things may get even stranger than that! The tale begins with Matt Fuller, a research assistant in the physics lab of Professor Marsh. As part of his job he has built for the professor a gadget that emits one photon at a time for calibration purposes. But when Matt pushes the reset button, the gadget blinks out of existence for an instant. "Look!" Matt yells, but the professor just says neither one of them has had enough sleep and goes home.

Now Matt isn't very ambitious and he doesn't seem to be the brightest bulb in the pack. He used to be a grad student, but he's let that slide. But he's enough of a scientist not to leave his gadget alone.

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He pushes that reset button again and again, and each time the gadget is gone a bit longer, twelve times longer each time. Pretty soon, he realizes, it will be gone for hours, days, years, centuries. So he figures out how to attach himself to it—using a friend's antique (metal) car—and pushes the button.

The next thing he knows, the car is a wreck in the middle of the road, he's being arrested on suspicion of murdering the friend, and someone who looks a bit like him has handed a lawyer a fat check for his bail. The next step—you guessed it!—is to push reset again, which lands him in a Boston where technology has vanished, everyone is poor and devoutly Christian, the Second Coming is in the past, MIT is the Massachusetts Institute of Theosophy, and Jesus Himself wants to talk to him. It doesn't matter that Matt can think of a dozen rational explanations for the Jesus image in front of him—holograms, pressor beams, etc.—for the pressor beams can cause pain if he doesn't knuckle under.

Time to press that button again, eh? This time he has a companion, Martha, the graduate assistant assigned to him at MIT, and though the new future looks a lot more like what he was used to, it isn't. In fact, once he gets acquainted with how it works the reader can't help but think of the Singularity.

Haldeman doesn't pound that in. But he does make it clear that managing humans and keeping them from causing trouble may be done in more than one way (neither of which appeals to me).

But Haldeman is one of the greats. His books rarely fail to be both thought provoking and entertaining, or appealing in other words. I commend this one to your fond attention.

Imagine a world where vast bridges curl across the seas, their origins lost to myth and legend. Multiple linked spans form spirals between which folk move on boats. The folk themselves—some are human, but there are also snake people and elves, among others, and the humans appear to be of a different race and culture on every span. Fortunately, when one passes through the gate to any span one acquires the local language. Local customs are another matter, as are the stories people tell each other to explain themselves and their history. Since there are so many spans and peoples, there are a great many stories, and the role of storyteller is an important one.

There are also a great many gods, who occasionally appear to people parked in the Dragon Bowls that extend from the sides of the spans, hoping for special dispensations or gifts. One such person was the idiot child Diverus, who was not parked on but chained to the Dragon Bowl by his owner in hope of wealth. But when the god appeared, the gift was invisible—Diverus was no longer an idiot, and he had sense enough to keep his mouth shut while his mistress sold him to a sort of brothel.

The gods also appear to others, as when the storyteller and shadow-puppeteer Leodora climbed a tower and a statue awakened to make a few ominously cryptic remarks. This is where **Shadowbridge** begins, with most of Gregory Frost's impressive world-building yet to be revealed. First must come Leodora's back-story: She was an orphan, consigned to life as a fish-gutter on a backwater island, mistreated by her guardian uncle, rejected by the locals as the daughter of a witch. But there is the drunkard Soter, who it is soon revealed once traveled with her father, the thoroughly legendary storyteller Bardsham. Soter even has the cases containing Bardsham's shadow-puppets and booth, and when Leodora discovers them it is soon clear that she has inherited her father's gift. Soter begins to tell her the old stories and teach her what he knows of the puppetry. Yet he is strangely reluctant to admit how good she is or to encourage her in her dreams of leaving the island for the spans.

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But events conspire. A vaguely man-shaped piece of coral appears, and she is moved to pack it with the puppets. A young sea-dragon takes her for a ride, nude, and the villagers, who think dragon riding is for men only, are scandalized. The marriage her uncle has arranged to a local idiot is off. And she and Soter must flee to the spans, where of course her vast talent is promptly manifest, the statue speaks, and she finds Diverus whose god-given talent has turned out to be the ability to play any musical instrument ever made superbly. Since every storyteller needs a musician, the reader immediately suspects that Leodora is following a script the gods themselves have written, but if that is so, Frost is still a long way from revealing it. Instead he drops hints about Leodora's father's career, her mother's death, the disaster that made her an orphan, and the mysterious Agents who may or may not be looking for her.

What's going on? Frost doesn't say, but this is just Book One of two. It's fascinating world building, masterful setup, and I am eager to see how Book Two goes when it appears in summer 2008.

The puff sheet calls it the conclusion to the Time Odyssey series, but the end of Arthur C. Clarke's and Stephen Baxter's **Firstborn** leaves room for more. Whether we will see more is a different question.

But to get to the matter at hand . . . The series began with *Time's Eye*, in which some mysterious power transformed Earth into a patchwork of eras, climates, geographies, and peoples. Silvery spheres or "Eyes" floated in the air to watch how Russian astronauts coped when they met Genghiz Khan, British tommies met australopithecines, a UN squad from the Afghanistan front met the tommies, and everyone went up against Alexander the Great. Bisesa Durt, a UN observer, found the Big Ball in the Temple of Marduk in Babylon and after suitable revelations found herself at home, with the sequel, *Sunstorm*, about to reveal that some extrasolar enemy was about to make the Sun flare and toast humanity out of existence. There's just time enough to build a massive shield in space. Humanity survives, battered but intact, but that alien foe is not about to quit. *Firstborn* opens with the discovery that a massive object is headed toward Earth. It's not just a rock, for it destroys the first investigating spacecraft and resists every effort to deflect or destroy it. It's a "quantum bomb," and it has our name on it.

What to do? Evacuate? That's a tall order, but before it comes to that Bisesa, fresh out of coldsleep, is inveigled by her daughter into a trip to Mars, where ancient Martians apparently managed to trap an Eye. Firstborn technology is *not* unconquerable. There is hope, and the chief point of the novel is the pursuit and realization of that hope.

A lesser point is the portrayal of the Firstborn, never met except by their actions, as a jealous people, dedicated to destroying potential competitors wherever they might arise. Near the end, Earth's telescopes detect a galaxy full of giant light-sails and generation ships, a sky full of refugees. Since Earth has managed to defeat the Firstborn (at least for now), the next step would seem to be an attempt to contact some of these Others and build an alliance that might take the war home to the Firstborn. That could mean another trilogy, but I have no clue as to whether such a thing is in the works.

But we can hope.

L. E. Modesitt, Jr., adds another link to the long chain that is the saga of Recluce with **Natural Ordermage**. Recluce is an island on a world where magic takes the classic form of order versus chaos, except that the two are clearly kin to concepts familiar from physics. Chaos, for instance, is like entropy; when a chaos-mage releases a bolt of chaos-fire, it va-

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porizes whomever the bolt hits, maximizing entropy. Order is pattern, and in previous books we have seen order-mages able to sense the bonds between molecules and atoms. Indeed, when the black wizards of Recluce forge iron they infuse it with order to give it strength. Not surprisingly, those who can manipulate order or chaos (only rarely can anyone handle both) are highly valued. Once identified, they are assessed and trained and sent where they will be of most use. Recluce favors order, and chaos-talents are exiled. So are order-talents who cannot be trained.

So meet Rahl. He's a scrivener (scribe) copying books by hand for his father. He has a small amount of order-talent, visible in the way he can coax ink to ripen and girls to surrender. That last is what gets him in trouble and may be what calls him to the attention of the local mages, who in due time ship him off to Nylan. Unfortunately, though he has definite talent—enough to be destructive—he seems unable to learn how to control it. He has to try something, and then he can either do it or not. He is, he is told, a natural ordermage. Quite untrainable, a danger to have around. So they train him in clerkship, teach him Hamorian, and ship him off to Hamor, a dictatorship that has a rather no-nonsense attitude toward order and chaos: Both are valuable but they must be kept in balance.

Poor Rahl. He feels much put upon. If only people would tell him what they expected, what to do, instead of expecting him to just figure it out. It just ain't fair! And it ain't about to get better. His job is to be a clerk in the office of the factor who handles Recluce's trade. Unfortunately, he soon grows suspicious of certain irregularities and winds up a drugged amnesiac, wrapped in a carpet, and shipped off to be a slave in Hamor's steel mills. In due time, his memory begins to return, his talents draw attention, and he undergoes training by someone who understands a bit more about how to get him to focus his attention.

Finally, he gets it! He feels less unfairly treated, and when he is posted as an order-mage back to the factor's town, he is just in time to nip a dastardly scheme in the bud. He's something of a hero now, and his development has really only begun. The next volume of the duology will see much more, and I suspect Modesitt will pay more attention to the Hamorian approach to balance.

This volume begins slowly, but Modesitt can be counted on to develop the momentum and excitement even as he develops well-rounded characters and a thoughtful frame. As always, he's well worth your attention.

Modesitt doesn't write many short stories, but he has done enough to fill **Viewpoints Critical: Selected Stories**, which includes three originals, one of which ("Black Ordermage") is set in Recluce. Is he as interesting in short form as in his novels? Well, in his very first story, "The Great American Economy" (*Analog*, May 1973), he managed to provide a preview of cybercrime. That alone may be enough to convince you to pay attention to his thoughts.

Ray Bradbury is as famous as ever, but his stories aren't what they used to be. (Or perhaps this reader isn't what *he* used to be.) As a case in point, pick up a copy of **Now and Forever**, which offers a pair of never-before-published novellas, "Somewhere a Band is Playing" and "Leviathan '99." The latter, a tribute to Melville's *Moby Dick*, is the weaker of the pair. It was first produced as a radio script nearly forty years ago and later became a stage play of which Bradbury says, "The critics' reviews were unanimous in their vitriol." He's chipped away at it since, with the present final result. Ishmael is a young spacefarer, bunked with the alien Quell aboard the *Cetus 7* whose mad captain is in pursuit of a giant world-gobbling comet, which he seems to see as loaded with willful malice. So the mad chase is on, with dis-

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aster at its end, but Bradbury's voice is all atmosphere and little sense. Certainly there is little sense of astronomical verisimilitude, as we see when he has Quell announce that his home is some ten million miles and five light years distant, and never mind that there is no star at that distance from Earth.

Well, atmosphere was always Bradbury's forte, and when he was young he brought it as a breath of fresh air to science fiction and fantasy. The result was popularity beyond the genre ghetto and an unleashing of other atmospheric writers. But at his best, Bradbury brought more than atmosphere to the page, as he does with "Somewhere a Band is Playing." This one opens as a man, writer James Cardiff, leaps from a slowing train onto a shabby train platform. Summerton is the town, and its quite appealing residents turn out to be immortals who make their livings as writers. It's a charming conceit, threatened when one of Cardiff's competitors appears and threatens to spill the beans about Summerton's existence. But Summertonians are accustomed to confrontation by the outer world. They have moved before, lock, stock, and barrel, even the buildings and cemetery, and they will again if they must. Cardiff is invited to come along, for if he found them he is surely one of their kind. But he feels obliged to return to fiancée and friends. Will he ever come back? *Can* he, if they move and hide themselves again?

There's more sense to "Somewhere," and as well a poetic charm of the sort familiar to Bradbury fans. There's also a lot of atmosphere, verging on treacly sentimental twaddle.

Your mileage, of course, may vary.

According to James Patrick Kelly and John Kessel, the greatest contribution of cyberpunk to the SF genre may have been its "uncanny ability to broadcast [the science-fictional idea that the physical, mental, and moral structures that most of us live by are radically contingent] to the culture at large." It did do that, using an idiom of streetwise loners in a world without recognizable mothers, teachers, office workers, and so on, which made it pretty much a cartoon view of the world. Classic cyberpunk was declared over and done with two decades ago, but the themes that marked it continued, both in SF and in other media (Kelly and Kessel call *Wired* magazine "the *Popular Science* of cyberpunk"), including TV, film, and advertising.

What were the cyberpunk themes, or its "signature obsessions"? Kelly and Kessel list global perspective on the future, stress on infotech and biotech especially that with the potential to transform the human body and psyche, a gleefully subversive attitude toward traditional values and received wisdom, and a crammed prose style. Much of this of course marks SF at least as far back as the forties, and it is very easy to find it in current work, which they prove in **Rewired: The Post-Cyberpunk Anthology**. Here you will find stories by classic cyberpunks William Gibson and Bruce Sterling, but also by Michael Swanwick, Cory Doctorow, Charles Stross, Paul Di-Filippo, Mary Rosenblum (her "Search Engine" is the only tale from this magazine), and nine more.

Names to conjure with, and stories to match. Not a dud in the lot. Enjoy it.

The late Ted Sturgeon was one of the greats. If you believe what Harlan Ellison says in his foreword to **The Nail and the Oracle, Volume XI: The Complete Stories of Theodore Sturgeon**, he may even have been the greatest SF writer ever. Sure, he was quirky, but he could write like an angel and he well deserves the adulation directed toward his ghost since his death in 1985. The present volume collects a dozen of his works from 1957 to 1970, "his prime story-writing years." One of the stars of the collection is the famous "If All Men Were Brothers,

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Would You Let One Marry Your Sister?" Another is "Runesmith," cowritten with Harlan. For the rest, order a copy. Sturgeon, as long as he's been gone, is not a writer one regrets reading.

Every year, the Science Fiction Poetry Association hands out its Rhysling Award (named after Heinlein's blind bard of the spaceways) to what its members deem the best examples of short poems and long poems. Members of the SFPA nominate one in each category, and all the nominees are presented to the membership in an annual anthology. **The 2007 Rhysling Anthology** holds 79 of the best SFF poems published in 2006. Some did not impress me, but a few did. Lawrence Schimel's "Kristallnacht" is a retelling of the Cinderella tale that echoes eerily of history. G. O. Clark's "Spot in Space" is a nice commemoration of the dawn of the space age. William Sanders's "The Last Madman" could be taken as a paean to Prozac and its ilk, but that's not the way to read it, not at all.

The best poetry is both provocative and disturbing. You will find here a number of examples to support that statement.

IN TIMES TO COME

Our lead novella for May is David Bartell's "Test Signals," a novella very different from the author's earlier stories here, but engaging and disturbingly thought-provoking. Disturbingly, because while the concepts explored may seem farfetched to some, they're solidly rooted in questions beginning to be raised here and now. Some of a person's most bankable assets are now things far more . . . *personal* than the ones we've tended to think of in the past, but the law has only begun to consider who actually owns them. This, or something like it, could happen to you. . . .

Edward M. Lerner's novelette "The Night of the RFIDs" also has origins uncomfortably close to home. In addition, we'll have a mixed bag of other stories, in a wide range of flavors, from authors including Dave Creek, Ronald L. Lambert, Carl Frederick, and Sarah K. Castle (a newcomer who recently made a splash here with "Kukulcan").

The fact article comes from linguist Henry Honken, continuing his campaign to expand our linguistic horizons. The title "Strange Croaks and Ghastly Aspirations" is not his personal aspersion, but rather an early European observer's impression of the South African "click" languages, on which Honken has himself done some recent research—which will surely stretch almost anyone's understanding of just how widely languages can vary, even among humans!

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BRASS TACKS

Dr. Schmidt,

Please convey my great appreciation to Barry Longyear for his excellent stories with Harrington Jaggers and Guy Shad.

My greatest gratitude is for his wonderfully "proper" use of the English language. His adverbs are in the right place and he does not use the word "up" in improper places. His prepositions are a joy to behold. Surely he has a British education.

His stories include adequate humor, mystery, and wildly futuristic technology. That makes them distinctively entertaining. I like my stories entertaining. Not that there are not many references that inform and educate me.

Thank you for publishing his stories. Some of the others aren't too bad either.

Joye Martens Burdette
San Diego, CA

Dear Dr. Schmidt,

I always enjoy your editorials. I find them stimulating and often instructive. It is therefore disappointing that you subscribe to the Popular Vision when it comes to population growth (most recently: "Double Standard Required," November 2007). The Popular Vision on population growth is flawed, because it focuses on the costs of additional humans, while ignoring the benefits. Each additional person adds a pair of hands and a brain, implements that are indispensable in improving our lot.

Imagine a twenty-second century with ten, twelve, or, better yet, fifteen billion people. Imagine that technological progress in the next century will surpass that of the previous one, as it appears to be accelerating. Imagine that productivity will have increased by as much as it did in the last century—perhaps more, as dysfunctional political systems are discarded. This future population will be capable of feats we can't conceive. It will most likely be able to decide what the temperature of the Earth should be, then make it so. It will certainly be able to deal with the consequences of climate change.

Natural resource depletion is a myth. The only truly limited resource—the only resource whose unit price has consistently gone up throughout the history of civilization—is man (in a gender-neutral sense). Therefore, we need more humans, not fewer.

Henri Hein

And more Easter Bunnies, Tooth Fairies, and Santa Clauses would help even more. Each additional person also adds a digestive system, a respiratory system, and a body that has to be housed, and the needs those are *making are currently more significant than the contributions that future hands and brains* might *make. When our numbers are already causing big prob-*

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lems, increasing them further with the vague hope that our descendants will solve the problems we've created seems the height of irresponsibility.

And besides, not everybody likes living in crowded conditions.

Dear Stan:

I enjoyed your November 2008 editorial, "Double Standard Required." Allow me to suggest that, though your observations were correct, you didn't go quite far enough. I suspect the reason no one nowadays wants to discuss overpopulation is that in order to solve it, we must inevitably find ourselves discussing an even more third-rail-type issue: playing God.

Given the state of society today, no discussion of population controls will take place without some—probably all—factions insisting those controls should be imposed on *everyone else:* on, in other words, the *less deserving*—those of the wrong religious or racial persuasions, those with the wrong sexual preferences, those with family histories of genetic disorders, lower IQs, lower earning potentials, those who tend toward obesity, those with substandard vision, those with a tendency toward zits, flat feet, or early balding—those whose families demonstrate a predilection toward elitism . . .

No one who breeds dogs or horses, or has seen the result, can have any doubt that selective breeding coupled with rigorous culling eliminates negative traits and reinforces positive ones. The question that will have to be faced one day is just what constitutes negative and positive traits, and who gets to choose.

From the beginning of life here, every life form has encountered *something* that eventually limited its spread. The arrogance with which Mankind denies that this applies to himself is little short of breathtaking. I predict that the philosophical difficulties surrounding population controls won't be settled prior to Mankind's learning what his own limiting mechanism is. I predict even more certainly that we won't enjoy the discovery.

David R. Palmer

Dear Stan,

"Drilling to the Golden Age" was an interesting article with a number of good points. However, I feel that the points raised do not provide sufficient evidence to change our educational system.

I can testify as to the "Mark Twain" comments. I was raised on a cattle ranch, where we had between 250 and 300 cows. As a youngster I was amazed at the ability of my father and our foreman to discuss specific cows and their calves. They knew every cow and who their mothers were. I was going to high school at the time and I was only exposed to most of the cattle in the summers and on weekends during the winter when we fed them. Then when I was a sophomore, I started to develop this ability. By the time I was a senior, I could do fairly well—still not as good as my father and foreman, but okay.

Then I graduated from high school and went to college. The ranch was sold because of my father's health. I had had a "river pilot" moment, but it passed and I never needed to recover it again.

In college I discovered computers and became a pretty good programmer. I became good at discrete event simulation programming and environmental analysis programming. In both of these areas I could see a problem and almost always sit down at the keypunch or terminal and write down a solution. Not at the same time, however. It took me several years to develop this ability and it was lost if I didn't keep it up. After these, I never had any more "river pilot" moments because my duties were more varied.

Not trying to brag—I never did go on to get a PhD—just explain my credentials. I had what I believe was the last (remote) account on ILLIAC in Urbana-

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Champaign—it didn't work for us, I used primarily the 50-75 ASP (or perhaps HASP) system at the U of I and then we moved to Boston and I used the MIT cp-67/cms system—never MULTICS. After funding evaporated I got a position at Washington State University, where I did mostly environmental analysis for a number of years. Then Reaganomics hit and I did junk jobs until I retired.

The point I am trying to make is that the total internalization of a subject—the "river pilot" moment—is absolutely essential for excellence in a very specific subject area. However, it is not generalizable if the person is faced with a change in requirements—a job change for example.

The idea of "making learning fun" is somewhat of a cheap shot. What I think you need in a general education—say less than the PhD level—is enough familiarity with the subject so that if the need is there, you can go on and self-educate yourself in a particular area. If you are planning on being a mathematician or physicist you may very well need to totally internalize most mathematical operations. This would be totally useless for an anthropologist, biochemist, or history major. They would have other needs. I was able to develop this ability three separate times—but after that it became useless and I lost it.

The other approach to this would be from the psychology, neurology, and physiology of learning. I believe that this technique, the "river pilot" moment, is very similar to what the psychologists would call operant conditioning—the Pavlov dog or Skinner pigeon technique. The psychologists have been exploring this brand of learning for over 100 years and it has never gotten very far. The results are clear and very repeatable, but they don't generalize to the real problems of education. Try explaining children's language learning using operant conditioning.

More complex learning tasks, like learning from reading a book or listening to a lecture—or even performing an experiment—are slowly starting to yield results using the techniques of cognitive science, neuroanatomy, and neurochemistry. People like Eric Kandel, George Lakoff, and a whole lot of people in-between these two "ends" are finding out a lot about how people learn. I believe that it would be much too early to say which particular theory of human learning implies the best teaching techniques, but we definitely know that there are at least two separate methods of learning and they both work, but they work in very different manners. It would be a tremendous mistake to pick one and say that this is *the* correct way to design our education system.

My own personal experience in raising children and listening to my wife, a long time high school science and math teacher, convinces me that different people learn better using different techniques. It is a very great mistake to pick any one "method" and expect it to work for all students.

On a completely different logic, this is the "method" of evolution. Throw a whole bunch of possible solutions at the problem and see which ones survive. However never loose your variability, for tomorrow (or maybe the next million years) could have a whole new set of problems. It only takes one Einstein, Dawkins, or Hawking (primate?) to make your whole school system look like a winner.

Bryan Bremner
Republic, WA

My experience parallels that of you and your wife. I taught physics and other subjects for a decade at a college small enough to get to know my students as individuals, and I never met two whose minds worked the same way. ■

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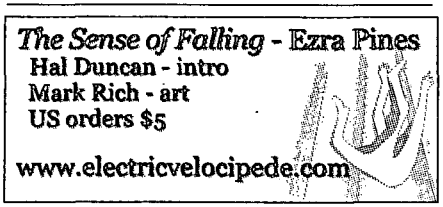

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Alaska Writers Guild call for entries for Ralph Williams Memorial Short Story Contest. Grand prize: $5,000, division prizes of $1,000, to be presented at 2008 Speculative Fiction Writers Conference, Anchorage, October 1-5, 2008. Two written critiques provided for each entry. Contest deadline: April 15, 2008. For guidelines and application, visit www.alaskawritersguild.com, or write to: 9138 Arlon Street, Suite A-3, Box 910, Anchorage AK 99507

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UPCOMING EVENTS Anthony Lewis

24–27 April 2008
2008 NEBULA AWARDS WEEKEND (SFWA Awards) at Omni Austin Hotel Downtown, Austin, Texas. Hosted by the Austin Literary Arts Maintenance Organization (ALAMO). Info: http://www.sfwa.org/awards/2008/index.html; nebulas2008@sfwa.org

25–27 April 2008
COSTUME-CON 26 (SF and Fantasy costuming conference) at DoubleTree Hotel San Jose, San Jose, California. Membership: $85 until 1 January 2008, more thereafter. Info: http://www.cc26.info/; info@cc26.info; CostumeCon 26, 1875 South Bascom Ave, 116-276, Campbell, CA 95008

25–27 April 2008
RAVENCON 2008 (northern Virginia SF conference) at Crown Plaza West Hotel, 6531 West Broad Street Richmond, Virginia. Author Guest of Honor: C.S. Friedman; Artist Guest of Honor: Stephen Hickman; Fan Guest of Honor: Erwin S. "Filthy Pierre" Strauss. Membership: $30 until 31 December 2007, $35 until 18 April 2008, $40 at the door. Young Adults (12-17) $15, Children (11 and under) FREE, 10% military discount with military ID. Day Rates: Friday $15; Saturday $25; Sunday $15. Info: http://ravencon.com; info@ravencon.com

9–11 May 2008
LEPRECON 34 (Arizona Art-oriented SF and fantasy conference) at Francisco Grande Hotel & Golf Resort, Casa Grande, Arizona. Artist Guest: Howard Tayler; Author Guests: Emily & Ernest Hogan; Local Artist Guest: Liz Danforth; Special FX/Makeup Guest: David Ayres. Memberships: 1 November 2007 and after to be announced. Info: www.leprecon.org/lep34; lep34@leprecon.org; (480) 945-6890; LepreCon 34, PO Box 26665, Tempe, AZ 85285.

23–26 May 2008
Balticon 42 (Baltimore SF conference) at Marriott's Hunt Valley Inn, Baltimore, Maryland. Guest of Honor: Connie Willis; Artist Guest of Honor: John Jude Palencar; Music Guest of Honor: Urban Tapestry; Masquerade MC: Martin Gear. Membership: $46 until 28 February 2008, $51 until 30 April 2008, $59 thereafter. Info: www.Balticon.org; balticoninfo@Balticon.org; (410) 563-2737; Balticon 42, PO Box 686, Baltimore, MD 21203-0686.

23–25 May 2008
CONduit XVIII: (General interest science fiction convention) at Radisson Hotel Salt Lake City, Salt Lake City, Utah. Guest of Honor: Michael A. Stackpole. Membership: until 1 May 2008, adult $35, teen $30, youth $17.50, child FREE, family (2 adult, up to 4 teen/youth) $125. Info: conduit.sfcon.org, CONduit, P.O. Box 11745, Salt Lake City, UT 84147-0745. ■

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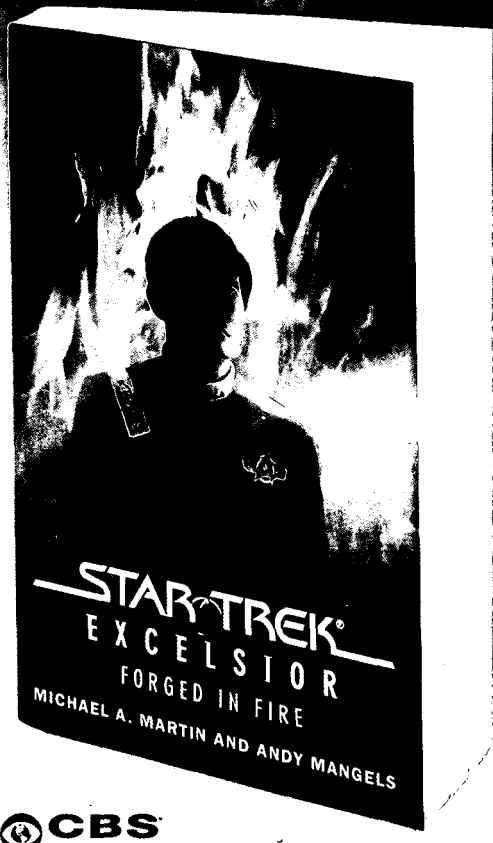

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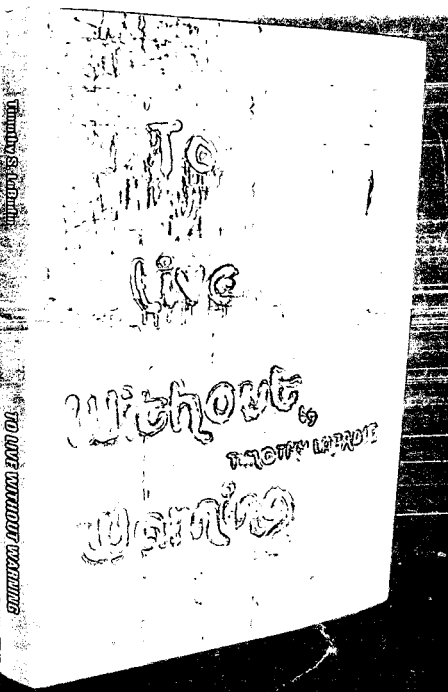

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